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Issue #40 December/January 1988 $2.95

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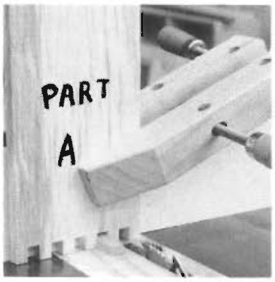

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On the Cover

Just one of many delightful gift projects in this issue, this box of oversize dominoes will please anyone who finds it under the tree. Hugh Foster likes long games so he made 40 dominoes instead of the usual 28. He tells how on page 36. To make the box, see Bill Bigelow's article "Making Box Joints on the Table Saw" on page 38.

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Clear Cuts

I remember the incident very clearly, even though it must have been more than half my life ago. I had previously nailed boards to a tree's trunk and limbs, but that was the extent of my woodworking experience. Now I was in woodshop and maybe twelve years old. I knew I liked shop right away, but there was a specific, frightening moment of enlightenment that got me hooked on it.

I don't know where the interest came from. My dad was never any good with tools. He was a word and idea man. It was kind of ironic, because he approached every aspect of life with a cool, reasonable mind, and yet, whenever he tried a home improvement project — or had anything to do with tools, it would end with loud cursing and often with the smashing destruction of whatever he had been working on. But, as I was to learn that day, this approach had its logic, too.

My first real project (not including the block of wood with the nail through it for skewering memos) was to make a spice rack for my mom. I had very carefully measured the height of the bottles (3½″) and their width (2″). I planned to have two shelves with five bottles each so I cut them 10″ long. The little rail that held the bottles in was also 10″ long, and the shelves and the sides were all 2″ wide. I carefully assembled it with glue and finishing nails, puttied the holes and sanded it. I stained it dark walnut so it would go with Mom's cabinets.

When I brought it home it was still tacky, so we left it on the workbench to dry overnight. Saturday morning, dad helped me hang it next to the stove. It looked great until we tried to put the bottles in it. They were the same height as the space between the shelves; there was no way to fit them down behind the rail. We took the rack off the wall and slid them in from behind, but the thickness of the rail made them stick out of the back. It took me a moment to understand why: I had fit everything to the bottles without including the thickness of the wood. With my dad's appreciation of logic, I suddenly understood the beauty of how things fit together, and from that moment on I have been fascinated by the logical construction of things.

At that same moment, my dad voiced his own line of reasoning. As he picked up the hammer, he shouted, "There's no way to fix the thing!" He smashed it over and over, and I screamed. It felt like he was beating on me with the hammer, and I imagined the sound I was hearing was my splintering bones.

But I forgive him.

I understand now that smashing my spice rack was what he had determined to be the logical action to take.

David M. Camp

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Letters

Popular Woodworking welcomes your comments, pro or con, about articles we publish. Send your letters to: Editor, Popular Woodworking, 1300 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.

Highchair Modification

Regarding my article "Grandpa, Build a Highchair for Baby," (April/May 1987) I would like to suggest a slight modification. Since I wrote the article, my wife and I have visited Japan where our son and his family are stationed, and I observed the use of the high chair by our granddaughter.

My suggested change is to cut away about one inch on each end of the lip (H). The resulting corners on the top edge of the lip could be angled or rounded. This change will eliminate the two corners in the footrest which are prone to catch crumbs, spilled milk, etc., making it much easier to clean. One caution, however: do not eliminate the lip completely because I watched little feet depend on that lip a great deal when climbing in and out of the high chair.

Roger Paulson
Minneapolis, MN

Safety and Utility

In reference to Owen Cecil's "Build Your Own Power Utility Bench" (August/September 1987): all those exposed pulleys and belts are an accident waiting to happen. Mr. Cecil really should take the time to fashion some type of protective housing so his device is safer to use.

John Bertelson
Roswell, GA

Satisfied Customer

Remember me? I was the irate customer who wanted the plans for the "Connecticut River Valley Desk on Frame" (see "Letters" August/September 1987). Well, guess what? I got it built, and now I am a happy customer with a new Connecticut River Valley desk. I love it; it really came out nice. I have enclosed a photograph for you. As you can see I decided to use walnut instead of oak. I think it was a good choice.

I want to sincerely thank you for your response to my letter and for sending me the plans early. I got a good feeling to know that there are still some people who have concern about their customers. Your response is graciously appreciated.

As I promised in my letter, I am now a subscriber to *Popular Woodworking* and I will be from now on. Please continue to offer advanced projects like this in your magazine. Most of your competitors do not.

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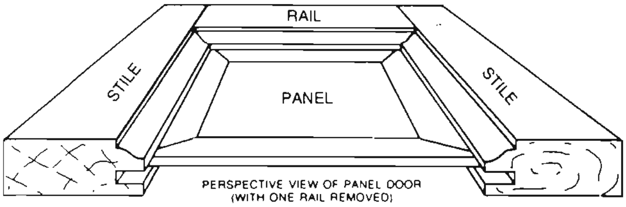

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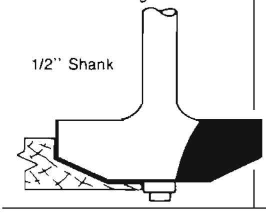

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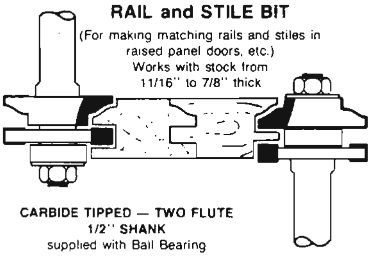

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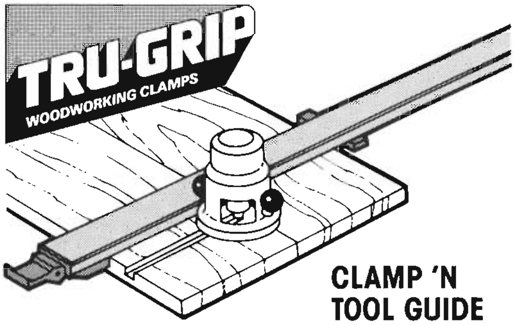

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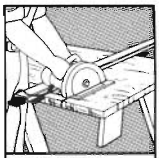

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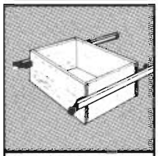

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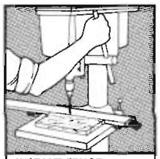

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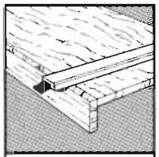

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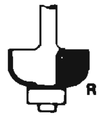		COVE				
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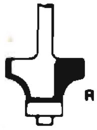		ROUND OVER				
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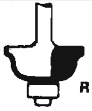		ROMAN OGEE				
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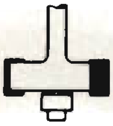	#11	3/8" RABBETING	Deep 3/8"	1¼"	1/2"	14.00
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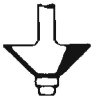
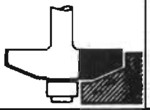
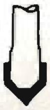
	#10	1/4" (KERF) SLOT CUTTER		1¼"	1/4"	14.00
	#12	45° CHAMFER	45° Angle	1½"	5/8"	15.00
	#15	RAISED PANEL	20° Angle	1-5/8"	1/2"	25.00
	#35	1/4" V Groove 90°		1/4"	1/4"	8.00
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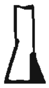
	#37	1/2" V Groove 90°		1/2"	1/2"	11.00
	#16	3/8" Dovetail 9°		3/8"	3/8"	7.50
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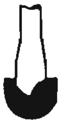		CORE BOX (ROUND NOSE)				
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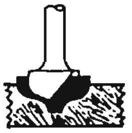		GROOVE FORMING OGEE				
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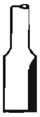	#24	1/4" Straight Bit		1/4"	3/4"	7.00
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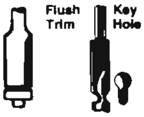	#13	1/2" FLUSH TRIM		1/2"	1"	8.50
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Two American Originals

Drew Langsner is a teacher and author whose subject is so-called "primitive" woodcraft. His woodworking is called primitive only because he makes his items with muscle–powered tools rather than electric ones. His book *Country Woodcraft* is as much about a way of life as it is about woodworking, and is *therefore* fascinating in a way few woodworking books can be.

Some might suggest that Langsner appears to have given up the "modern" lifestyle; I would suggest the contrary. In the fashion of a true conservative, Langsner will give up the old ways for the new when he's convinced they represent a significant improvement. In the shop, however, Langsner will question whether certain pieces - maybe any piece - of heavy equipment is worth its cost. He wants me to ask myself whether, as an occasional woodworker, I will ever be able to justify the cost of buying and maintaining my surface planer. The more I read of Langsner, the more my answer becomes "No." Were I in better physical condition - that is, had I worked more physically, as he recommends - I would be able to plane by hand quickly enough to never be able to justify those thousands of dollars expended.

Beyond this question of attitude, some of Langsner's projects are fascinatingly, almost hauntingly beautiful - and extraordinarily simple. His 1978 *Country Woodcraft* begins with felling a tree and splitting it; there are large sections about the shaving horse and the workbench. Most of the projects aren't furniture though. Rather, Langsner gives us woodworking, gardening, and kitchen implements, some baskets, and skills that will lead to high quality joinery for furniture. You won't read a better description of mortise and tenon joinery anywhere. His "projects" aren't of the "cut out these parts and assemble them according to these directions" variety. Instead, he uses a conversational approach that fairly begs the reader to see a way to do it that will more nearly meet his own needs, and then do it.

In 1982 *A Logbuilder's Handbook* appeared. The book may be more suited to "back-to-nature" homebuilder types, for it reviews felling, seasoning, hewing, and notching your timbers all as steps of building one's own log house. Additionally covered are shingle splitting, broadaxe sharpening, and raising the building.

Not counting his own labor (or that of his friends and neighbors), Langsner's log house cost $7.55 per square foot, a small fraction of what we'd spend for nice, average, middle-class housing; and all of that was spent at the local merchants' rather than on hauling things from all over the country. The chapters on site selection and design should be of interest to anyone planning to build a home, not just potential log-builders. Indeed, the whole book continues *Country Woodcraft*'s paean to wholistic, ecological living. I can't help but believe that Langsner's is a better way of life than the one most of us live.

His 1987 *Green Woodworking* strikes me as the book from this trio to buy, especially if you can have but one and your interest is close to what we have come to regard as traditional woodworking. Four pages of autobiography are all but guaranteed to fascinate you. The book's title was suggested by John Alexander, author of *Make a Chair from a Tree*, who felt the term "country woodcraft" excluded someone like himself who worked in the basement of his inner-city row house. Langsner has often wondered "Why bother?" about green woodworking. The answer, he concludes, is satisfaction, symbolic of an endangered way of life that is still very attractive.

After showing us which woods are good for what, Langsner reminds us that logging is dangerous and not quickly mastered. Then, in his usual conversational style, he explains how to do it safely and describes other sources of related information. Ensuing chapters take up knife-work, hewing, riving, shaving, boring, bending, and joining. These skill-related chapters comprise about five-sixths of the book. The last fifty pages are devoted to profiles of various "green" woodworkers. These include famous basket makers, canoe makers, sculptors, chair makers. One of these chair makers, Dave Sawyer, is noted for his guarantee: The chair will outlast either Dave or the original purchaser, or "If anything goes wrong, I'll fix it."

Appendices treat making a shaving horse and weaving a bark seat even more thoroughly than did *Country Woodcraft*, if that's possible. The excellent topical bibliography will greatly aid anyone who wants to pursue the pleasures of green woodworking even farther. Many people will want to do that, for Drew Langsner has made that pursuit most attractive.

Like Drew Langsner, Roy Underhill would have us study an older way of working wood. Most of us know him as the proprietor of the PBS television series "The Woodwright's Shop," videotapes of which have been reviewed elsewhere in *Popular Woodworking* (Issue #37 June/July 1987). Underhill works hard at making his presentation of nineteenth century (and earlier) woodworking attractive and intriguing; his enthusiasm sometimes borders on the corny, yet his teaching is superlative. If, like myself, you've been half-a-fan of the TV show, with reservations of one kind or another (maybe as simple as "Who's much into woodworking at 10:30 on Thursday night?"), you are likely to be a complete fan of his books. The clarity of the televised presentation is here magnified, and the books will allow those of us who learn slowly to go back over and again until we understand. Even better, the silliness or cutesyness that often accompanied Underhill's television enthusiasm is contained here, limited without diminishing his enthusiasm. Through text and pictures, Underhill shows us, in *The Woodwright's Shop*, tree felling, tools, and the manufacture of shaving horses, rakes, chairs, baskets, and dough bowls. He treats the use of the spring pole lathe, the treadle lathe, and the great wheel lathe. Later chapters treat blacksmithing, dovetail cutting, panel-frame construction, log houses, and timber frame construction. Despite the well-illustrated, large-format layout of the book, Underhill manages to give us no more than a taste of these many subjects. This book is a fascinating "beginning" on these crafts rather than an encyclopedic treatment.

The introduction to *A Woodwright's Companion* points out that *The Woodwright's Shop* follows the progression he follows in his classes, "...how to start with a tree and an axe and make one thing after another until you have a house and everything in it." The second book reminds us that "with each swing of the axe, each joining of the wood, you build and preserve within you the

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***Hugh Foster** is an English-teaching woodworker in Manitowoc, Wisconsin.*

living memory of this tireless trade." If Underhill's treatment is sometimes too cursory, his attitude is always exactly right! Shouldn't we have to figure things out? I don't follow directions very well, but after a concept has been impressed upon me, I'm ready to go. As Underhill says, "Knowledge is one thing; understanding is another." In this second volume, Underhill shows how to make and install various kinds of tool handles. Then he takes up saws and saw sharpening (with a fascinating glimpse at how our ancestors made their sharpening stones - much different from our laying $12 on the hardware store counter!), planes, more housebuilding, some toys and birdcalls, and a magnificent candlestand made from green wood. (Underhill points out that the Dominee craftsmen made the original candlestand in about eight hours, using only hand methods; it took me a week to make two in my powered shop. Hmmmmmm.).

The third Underhill volume, *The Woodwright's Workbench*, treats various workbenches, screw boxes and taps, more lathes (and how to make your own muscle-powered lathe), tool chests, chairs, domestic devices, a rowboat, and more about early buildings. A most intriguing chapter, with information I've not seen elsewhere, is called "A Field Guide to American Tool Marks." The chapter shows what kinds of marks the various tools leave on the wood and explains how and why this may or may not be an accurate guide to dating the work.

I believe you'll use Underhill's books enough over the years that the few dollars premium for hardbacks would be very well spent. I know my seven–year–old copy of volume one has had enough use to be ruined by now if it were a paperback.

One last thought: Three seems to be a magic number as woodworking books go. Krenov, Watson, and Frid appear to have had their say in three volumes. Langsner and Underhill are craftsmen-teachers of the same quality. Both are comparatively young. Let's hope they don't quit at three. PW

The Books

Country Woodcraft by Drew Langsner (Rodale Press, Emmaus, PA 18098 ©1978) 302 pages, hardback, $12.95; paperback, $9.95.

A Logbuilder's Handbook by Drew Langsner (Rodale Press, ©1982) 236 pages, hardback $15.95; paperback, $9.95.

Green Woodworking: Handcrafting Wood from Log to Finished Product by Drew Langsner (Rodale Press, ©1987) 304 pages, hardback, $19.95; paperback, $12.95.

The Woodwright's Shop: A Practical Guide to Traditional Woodcraft by Roy Underhill (University of North Carolina Press, P.O. Box 2288, Chapel Hill, NC 27514 ©1981) 202 pages, hardback, $19.95; paperback $12.95.

The Woodwright's Companion: Exploring Traditional Woodcraft by Roy Underhill (University of North Carolina Press, ©1983) 191 pages, hardback, $19.95; paperback $12.95.

The Woodwright's Workbench: Further Explorations in Traditional Woodcraft by Roy Underhill (University of North Carolina Press, ©1986) 248 pages, hardback, $19.95; paperback $12.95.

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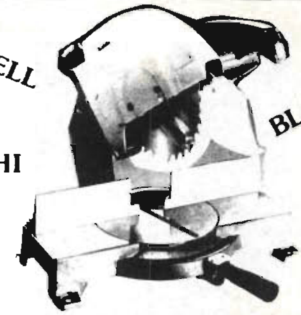
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Videoscene

by Alan Marks

Chip Carving with Wayne Barton, ©1987 by The Taunton Press, Box 355, Newtown, CT 06470, 60 minutes, $29.95/$14.95 to rent

Chip carving is a form of incised carving on flat surfaces. Triangular shaped chips of wood are removed with a special straight-bladed knife that cuts deeply into the surface at an angle. Sometimes the cuts are straight, sometimes curved, and the subsequent opposing cut (also at an angle) removes a wedge of wood that is triangular in cross-section. You might accomplish the same thing with the V-shaped instrument known as a parting tool, but with this knife, a chip carver can do much more. The knife cannot be used in very hard woods as can a parting tool, so softer woods, such as alder or basswood, serve the chip carver best.

My mind associates chip carving with antiquated Renaissance and Gothic furniture styles. Most chip carving is geometric, repetitious, and its designs convey rustic, country overtones. Actually, chip carving never interested me much until I watched this video. When it comes down to it, my taste leans more toward undecorated surfaces. Still, watching Wayne Barton carve fascinated me. It looked like fun. In fact, it looked like a very satisfying, even sensuous, activity.

Chip carving is the sort of thing one imagines Swiss mountain folk occupying themselves with when snowed-in for the long, dark, winter months. Seeing samples of Barton's work induced a pleasant, nostalgic feeling. He actually studied carving in Switzerland and runs The Alpine School of Woodcarving in Park Ridge, Illinois. His demonstrations on tape are detailed and, for the most part, clear, though at times too compressed.

For some obscure reason the video is divided up into two parts. In Part One, Barton describes his two knives, a "stab" knife, and a cutting knife, and the differences in their shape and use. He uses a pencil, a ruler, and a compass to lay out the designs of which there are two basic types: rosettes and borders. Additionally, he demonstrates lettering and something he calls "free form" carving, executed without any layout and based on traditional plant and floral designs.

He demonstrates what he calls negative borders, positive borders, and a pattern called a lace border. This terminology was not well defined in the beginning, and sometimes I found myself at a loss for what he meant. He then did a complicated layout with the compass and proceeded to carve an intricate rosette with twelve points. At this point I felt utterly confused, and then I rediscovered the small but quintessential pamphlet that accompanied the tape. Reading it made everything clear because it has drawings and step-by-step instructions for laying out most of the patterns he demonstrates.

In Part Two, Barton carves a swirl rosette, two Gothic rosette designs, two Gothic border designs, a free–form design, chip carved Roman lettering, old English lettering, and script form lettering.

This is the only video I know of that has been made on this subject, but anyone seeking further information would be well-advised to read Wayne Barton's book *Chip Carving: Techniques and Patterns*, published by Sterling Publishing Co., Inc., Two Park Ave., New York, NY 10016.

Carve a Ball-and-Claw Foot with Phil Lowe, ©1985 by The Taunton Press, Box 355, Newtown, CT 06470, 115 minutes, $39.95 /$14.95 to rent

It's funny how music sets the mood for things. Each of Taunton's tapes is set to a different melodic accompaniment, and each time I resent having my emotional strings plucked. This time we open peering through a quaint multi-paned window in a charming Victorian home in a charming New England town. We listen to intermittent strains of Mozart and Scarlatti on guitar. I am tempted to feel very secure, anchored in a time where nothing changes, safely frozen in historical cold storage. Phil Lowe stands at his bench as cabinetmakers have stood for centuries, and uses hand tools as they were used for centuries. I am charmed, and resent it. It's problematic for me because I am painfully aware that a similar sentimental approach to the profession doesn't put meat and potatoes on my table, though I wish it did. Phil Lowe, besides being charming, makes his way as an instructor at the North Bennet Street School in Boston.

Lowe specializes in reproductions of Queen Anne and Chippendale furniture, and begins his demonstration with an historical discussion of ball-and-claw feet. He mentions European ball-and-claw and Chinese ball-and-claw and other related background information. Then he shows samples of three American varieties, indigenous to Philadelphia, Boston, and Newport. At first, all this seemed superfluous to me until I realized that the only real purpose of making ball-and-claw feet is to reproduce furniture from the past. My own tendency would be to carve just any foot that looked good and proportionally correct to me, but apparently that produces a bastard piece of furniture - a piece without a pedigree. Lowe chooses to present a version developed in colonial Philadelphia because it is the easiest of the three types to demonstrate to beginners. He combines it with a cabriole leg.

To start with, Lowe takes us up to his drafting room and shows how he would go about drawing such a leg for a footstool. This is the first time I have seen anything on tape about drawing techniques, and such material is sorely needed. In fact, I'd like to see an entire video about drawing techniques for developing furniture. After showing how to develop a profile for the leg on paper, Lowe copies the pattern onto 1/8" plywood from the paper by placing the plywood beneath the drawing and "stippling" the pattern, as he calls it. He takes a handle with a sharpened needle in one end and punches holes through the lines into the plywood beneath. Then he connects the holes in the plywood with a pencil line and saws out the pattern on the band saw.

He traces the pattern onto a squared-off blank of mahogany and cuts away the waste with the band saw, leaving what he calls "bridges" in two places. These

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Alan Marks is a cabinetmaker from Pacific Grove, California, and a contributing editor to PW.

"bridges" are cut off later, but they support the leg in the curved cutout area while one cuts the curves in an adjacent side. Another neat trick involved temporarily taping the scrap pieces that contain pattern information back in place for the adjacent side cuts. These two little tricks themselves are almost worth the price of the tape, and they can be used to make other types of legs or carvings as well.

Up to this point my attention was unwavering and the first half-hour or so of the carving demonstration really held my interest, but then it bogged down. It wasn't necessary to show everything Lowe did to provide adequate instruction. If you've been shown how to do one talon, there is no need to see the other three being done. It was a thorough demonstration, but quite repetitive. Close-ups were not always in focus, and at times Lowe's work begged for close-ups that weren't offered.

However, if you're really into ball-and-claw work, you'll brave it through to the end. There is a lot to be learned from this tape. PW

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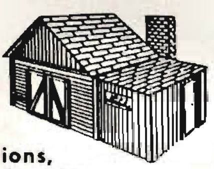

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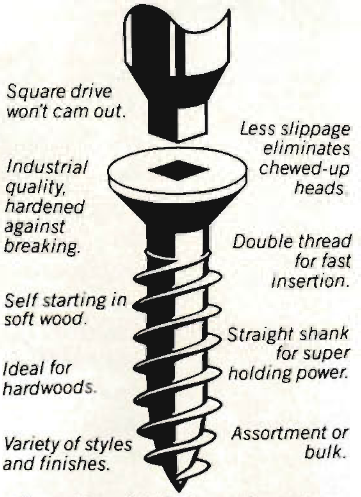
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Tax Strategy: Business or Hobby?

by William L. Smith

There has been much written and said about the Tax Reform Act of 1986. What specific changes will influence your tax bill? What's to become of the earnings and expenses from selling your wood*working*? As workers in our craft, we must each be aware of changes in the tax law which can change our tax liability.

There are some significant changes that must be understood by anyone who sells crafts to supplement his income before he files a federal income tax return for 1987. First, there is now a 2% floor on miscellaneous itemized deductions (MID). This means that expenses which were previously reported on Schedule A as MID are only deductible to the extent that they exceed 2% of your Adjusted Gross Income (AGI).

As an example, let's use a married couple filing jointly with an AGI of $32,500 (including $1,500 of income from the sale of craft items reported as Miscellaneous Income). In prior years, this couple would report their craft expenses of, say $680 on Schedule A as MID (along with such things as safety deposit box and tax preparation fees). In 1987, MID will only be included here in *excess* of $650 (2% of the couple's $32,500 AGI), whereas the full $1,500 of income must be included. In other words, only $30 ($680 less $650 floor) of expenses are now deductible. Federal Income Tax at 28% on $1,470 (the balance of their craft income) is $411.60.

The alternative is to report income from working their craft as a *business*. Using Schedule C (Income from a Trade or Business), $1,500 income less $680 expenses generates $820 self-employment income. The $820 is now the earned income (rather than $1,470) and is taxed, in this case, at 28% or $229.60. Self-employment income is also subject to Self-Employment Social Security Tax at 12.3%. This amounts to $100.86 for a total tax of $330.46. The savings of $81.14 is achieved using Schedule C rather than MID on Schedule A.

For craft workers using Schedule C to report income and expenses, a second significant change may come into play regarding the deductability of losses. So long as a business (including the craft business) reports a profit in three out of five years there is the presumption by the IRS that it is a business for profit. Previously the rule was two out of five years. If the three out of five rule is not met, the IRS could claim that the reported business (your craft) is a *hobby*, not a business. The result could be that the hobby income is taxable, but losses would not be deductible. A possible strategy to avoid this would be to not report all otherwise deductible expenses in certain years to create a small profit (to meet the three out of five rule) so that losses are deductible in the other two years.

As with any tax matter, always consult your personal tax advisor before making a final decision in your unique situation.

***William L. Smith** owns and operates a Comprehensive Business Services franchise in Tucson, AZ specializing in accounting, tax, and business consultation services to small business and self–employed professionals.*

Hobbies and Businesses: Knowing the Difference

by Peter Good

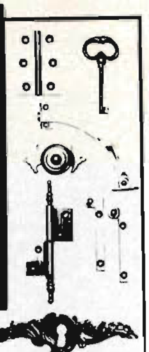
Since we all know the difference between a hobby and a business, a discussion of the matter seems rather pointless, right? I mean, we all know that a hobby is for fun and a business is for money and that's the long and the short of it, so what's the next subject? Hold everything. The issue I want to raise is whether or not we really keep the two things separate in practice or if we allow, perhaps not even consciously, our business and hobby to infiltrate or even become each other, possibly to the detriment of both. Most specifically, I want to inquire into whether or not what we're calling our business is really our hobby.

For some people, their hobby goes beyond the realm of leisure activities and enjoyable pastimes. It becomes their business. While this in itself is not bad, a problem could occur if we fail to acknowledge the fact that the hobby has now become a job and, like any other job, will now be expected to provide a satisfactory income and should be performed according to a normal and appropriate working schedule. The trouble comes when we say that what used to be our hobby is now our business, but we continue to operate as though it were still a hobby. This means such things as working erratic or inadequate hours, not being conscious of costs, not being efficient and not thinking too much about the future of this activity and what we expect to do with it in the long run. If the activity were still a hobby, none of these things would be of great concern to us. Twenty years from now, however, will you still be tinkering in your garage in the name of business or will you be sitting behind the president's desk of American Tinkering, Inc.?

Well, maybe you don't want to go that far, but it's important to distinguish between actually working and still playing around. I'd like to further distinguish between the hobby worker and the workaholic. Both love their work, take it home at night, do it on weekends and talk about their work at parties. They seem to be one in the same, right? Wrong. The one big difference is that the workaholic has a good income while the hobby worker is struggling to make ends meet, even though they both may have the same level of experience and ability. The difference is attitudinal in that the hobby worker has not come to terms with the fact that, while his activity may be enjoyable, it's not for fun, it's for money. I'm not suggesting that you become a workaholic; I'm suggesting that you consider adopting a new attitude of business reality if you think you may be in the hobby worker category.

The hobby worker may also (do I dare say it?) take too much pride in his work and try to make it too perfect. The big problem here, of course, is that this practice tends to erode the economic time frame and quickly reduces the profits. If it's a hobby, nobody cares; but if it's a business, you lose money. Another consideration is that, contrary to what we might like to believe, our hobby, much as we love it, may not be saleable. There's no point in beating our heads against the wall

*As the owner of Grand Openings, **Peter Good** manufactures doors.*



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trying to sell an unwanted thing to an unappreciative audience.

If I suspect that I may be pursuing an enjoyable but unproductive idea, I try to step back to view the situation from a wider, more objective position. Since love is blind, however, this doesn't always work. Another thing that helps is to ask for an evaluation from someone whose opinion you respect. This often hurts because it may seem like the evaluator is being critical of something that may be the equivalent of your cherished child. If, however, there seems to be a consensus of opinion that what you're doing as a business is really a hobby in disguise, it may be time for some drastic changes, maybe even - perish the thought - taking up a different line of work. PW

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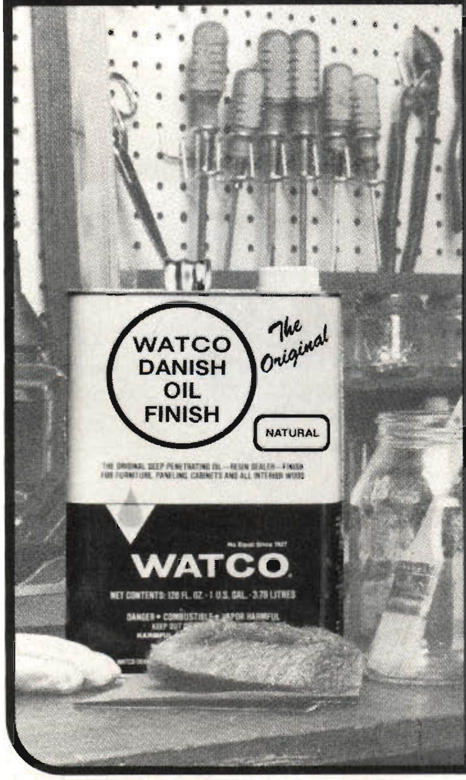

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Tests & Comments

by **Hugh Foster**

The Stanley #95 — An Appreciation

Reproductions of the Stanley #95 edge-trimming block plane manufactured by (from left to right) Lie-Nielsen TOOLWORKS, Inc., Wisner Engineering and Lee Valley Tools, Ltd.

The Stanley #95, a shear-cutting block plane with a built-in fence, was made from 1911 through 1958. It was out of production until about ten years ago, when it was reintroduced as a luxury tool of cast manganese bronze rather than its original cast iron. The "Wisner Plane," as we called it in this new incarnation, was available only from the manufacturer, Wisner Engineering, and only to those who were willing to wait for theirs to be made.

A friend bought one then, and I remember commenting derisively about paying "that much" for a plane, regardless of how nicely made or how useful it was. As it happened, we shared a couple of projects that summer and he brought it everywhere. Often needing to make a quick adjustment, I reached for whatever plane was handy, and usually it was the Wisner plane. It didn't take long to develop an appreciation of its rather unique virtues, and to prefer it to the more ordinary #60-1/2 block plane for edge-trimming work.

After these shared projects were finished, I found myself asking to borrow this extraordinary plane. When I borrowed it for the second time, I realized that I was hooked, that I had to own one, regardless of the price. Some months later, my own Wisner plane arrived with a spare iron; since then it has seldom been far from my hand.

Today the manufacture of this plane has been passed, absolutely unchanged, to a larger company, Lie-Nielsen TOOLWORKS, Inc. Now it is readily available from the larger fine tool shops – notably Woodcraft Supply (plane 17R21 @$124.95; iron 17R22 @$14.95), and Garrett Wade (plane 25P01.01 @$128.20; iron 25P01.02 @$19.90) – and it is well worth your consideration.

With this modern version of the Stanley #95, you can true up the edge of a board as quickly as with a jointer, and the edge you produce will be at least as square and straight as the jointed edge. What's more, the jointer's mill marks will be notably absent.

I use this tool to "spring" joints on stock that is no thicker than 7/8". I plane a shaving off all but the first and last few inches of a joint. This gap is "sprung" under clamping pressure, and as the ends of the board dry out and shrink over time, panels made this way have much less tendency to come apart at the glue joints. For me, this operation would be reason enough to have this plane.

Because the #95 takes a shearing cut at a very low angle, it does a better job of cleaning up both edge and end grain than do standard block planes – with the added bonus that the fence forces you to plane the work square. I can't imagine the fitting stage of a project without this plane at hand. There's much less tear-out than with a standard plane, especially if the wood has some contrary grain to it.

This plane does a better job than any other tool I know of at truing up plywood, which you certainly won't be running over *my* jointer. If you plan to use the #95 on plywood, buying the spare cutter becomes more a necessity than a luxury. My plywood cutting blade regularly shows the glue lines of the plywood, just as jointer knives would, but this 1" wide plane iron is far easier and less expensive

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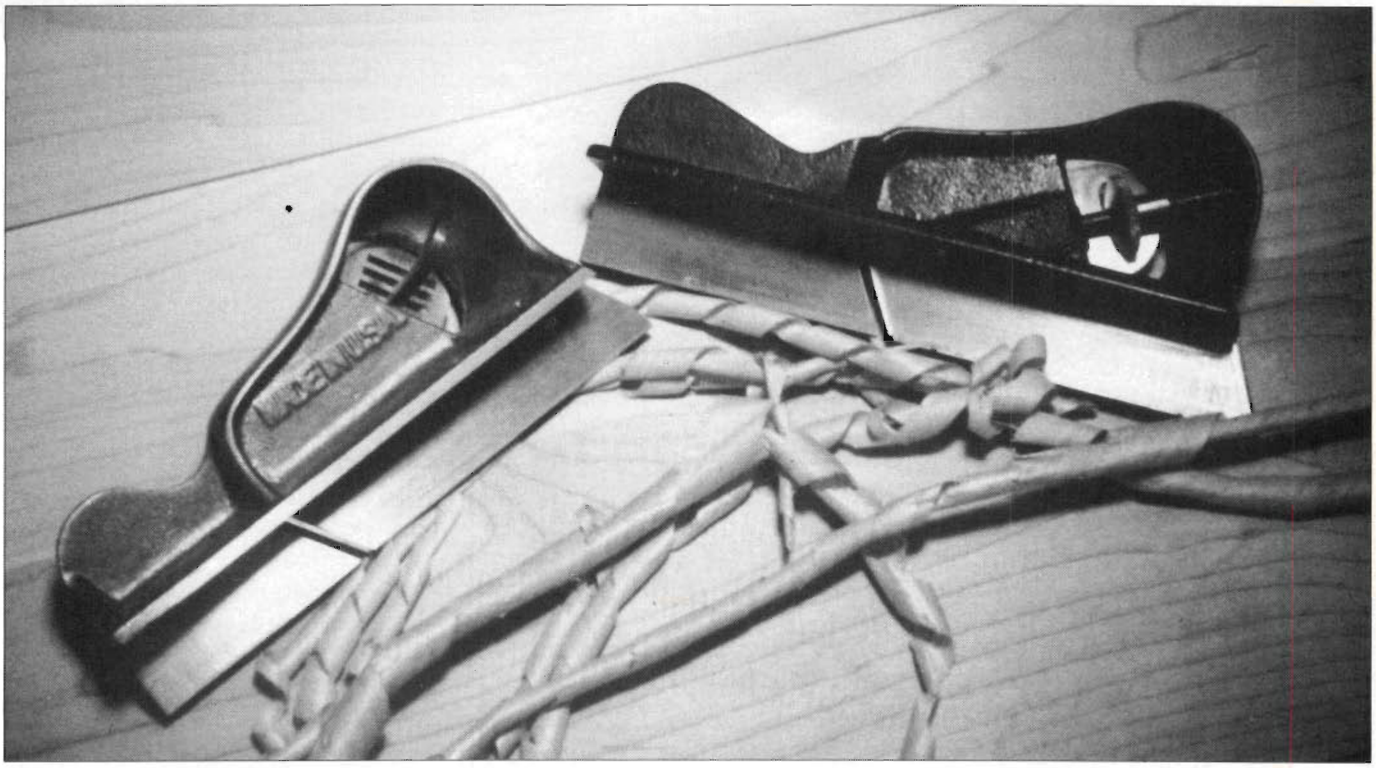
*When he's not pursuing freelance writing or teaching English, **Hugh Foster** designs and builds custom furniture in Manitowoc, Wisconsin.*



The Wisner plane (left) has the same lever–operated blade–adjusting mechanism as the original Stanley #95, while the Lee Valley tool (right) has a more stable screw mechanism.

to sharpen than a set of jointer knives.

Two holes in the fence are provided for fitting wedge–shaped shoes to the plane, useful for planing a piece you want to be out of square. In other words, you can use it to make miters, tapers, and precisely dimensioned strips of veneer.

The human engineering of this plane is nearly perfect. Left– and right–handers alike will feel readily "at home" with the plane, "righties" by pulling it, "lefties" by pushing. As a left–hander, I can tell you this isn't the case with many tools. People with hands twice the size of mine have used this plane with the same ease as I.

Finally, this manganese bronze version of #95 is quite simply a joy to behold. When new, the plane appears to be almost brassy in color; but unlike brass, this gets only richer and richer with age. It seems somehow sophomoric to call a plane beautiful, but this one is.

Another manufacturer, Lee Valley Tools, Ltd., has redesigned the Stanley #95 rather than copying it. Their cast–iron version (25P04.01 @$62.50) and its replacement blade (25P04.02 @$5.50) are available from Garrett Wade. The Lee Valley tool proposes to correct several design flaws in the original #95. They have lengthened the plane by about 3/4", almost all of that at the nose, providing better registration on the board at the beginning of the cut and improving overall accuracy. Additionally, they claim the larger size of the plane makes it a better fit for the modern hand; ten years' use of the other model disqualifies me from judging – that other model now is like a part of my hand. The other major change is that the lever–action depth control mechanism has been replaced with a screw mechanism which is both more sensitive and less likely to be knocked out of adjustment. Combining this improvement with the price, which is less than half the price of the bronze version, this quasi–#95 may be a desirable alternative to the Lie–Nielsen #95. If you don't care about the beauties of bronze and feel constrained by budget, this is the one.

The only woodworker I've known who didn't want a #95 after trying mine was an old cabinet installer who could plane "true" by eye. Of course it took him thirty years of daily practice to learn that, and goodness knows how many ill–fit joints he left along the way. I haven't had thirty years of practice, don't want the ill–fit joints, and deplore scrap. Those reasons, along with the tool's simple, elegant beauty are why this modern version of the Stanley #95 is near the top of my "can't do without" list. PW

Sources

Woodcraft Supply Corporation
Dept. PW127
41 Atlantic Ave., Box 4000
Woburn, MA 01888
(800) 225–1153

Garrett Wade
161 Avenue of the Americas
New York, NY 10013
(800) 221–2942

Lie–Nielsen TOOLWORKS, Inc.
West St. Ext.
West Rockport, ME 04865
(207) 236–8041

Lee Valley Tools, Ltd.
2680 Queensview Drive
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Tried and True

by Graham Blackburn

The Plough

I want to explain something about the spelling of "plough." While it's true that today in American English this word is spelled "plow," I think there is a case for using the older, British spelling in reference to the woodworking plane. The tool was introduced to America chiefly by British craftsmen and consequently "plough" was the spelling first used in this country, but even subsequent native ploughs (manufactured in America by Americans) were known by this spelling. Moreover, few ploughs were being produced by the time the word had changed forms. Out of respect for a fine and noble tool, I would like to stay with the spelling of "plough."

That the plough is indeed a "fine and noble tool" is what I hope to demonstrate in this article. It is not only one of the handsomest tools ever designed, but it is truly useful and deserves a place in the woodworker's toolbox just as much as on the collector's shelf.

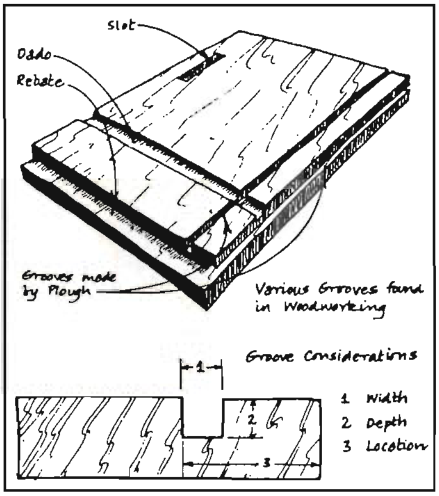
Various forms of ploughs have been around for hundreds of years, but the tool that is thought of today is usually an example of the type made during the nineteenth century. This period saw the manufacture of woodworking hand tools change from what was typically one-man operations to big business ventures involving factories with large numbers of workers. Although this change produced large numbers of "mass-produced" tools, it also saw the development of more expensive tools aimed at the more discriminating and more demanding consumer. As a result of this, ploughs were made that are truly works of art and were frequently cherished over all other tools.

In order to gain a clearer idea of the plough's history, let's return to the beginning of the nineteenth century and see how the changes in the way the tool was manufactured started its growth as an extraordinary tool.

As the infant American tool industry began to develop, there existed already two basic types of ploughs: the European and the British. The British type predominated right from the start of the tool's introduction to America. It soon gained complete ascendancy, and later split into two further types now referred to as British and Yankee. To understand what differentiated these types, it's necessary to examine more closely what the tool does and how it operates.

Graham Blackburn is a furniture designer/maker in Soquel, California, and the author of many books including The Illustrated Encyclopedia of Woodworking Hand Tools, Instruments and Devices *published by Simon and Schuster, 1230 Avenue of the Americas, New York, NY 10020.*

The plough plane, like its bigger namesake, the agricultural plough, cuts a groove across the surface of the material it is used on. There are many sorts of grooves that are used in joinery of all kinds by carpenters and cabinetmakers. These are usually distinguished by various names according to their direction and location in the wood. To describe just a few, there is the rebate (spelled "rabbet" in the United States), which is an open-sided groove at the edge of a piece of wood; the dado, which is a groove cut across the grain; and the slot, which is a closed–end groove. The word "groove" is usually reserved for an open–ended groove that runs with the grain, either on the surface of the wood or in the edge of a piece of wood. It is this last variety with which we are concerned, for this is what the plough does: it makes a groove.



When making a groove – in the edge or on the face of a piece of wood – there are three considerations to be taken into account. These are: the width of the groove, the depth of cut, and its location in relation to the nearest edge. A groove of any particular size may of course be created with a simple purpose–built tool such as a scratch stock – but this will be the only groove possible with such a tool. If you have three differently sized and located grooves to make, you will need three different scratch stocks. The beauty of the plough lies in the fact that it is so adjustable that all three considerations can be accommodated in almost limitless combinations. The mechanism that adjusts for the location of the groove is what at first differentiated the British type from the European type. This mechanism is simply a fence attached to the body of the plane by two arms. Varying the distance between the fence and the body of the plane changes the location of the groove in relation to the edge of the workpiece. In Europe the practice was to fix the arms to the body of the plane and slide the *fence* in and out as needed. In Britain the practice was reversed – the fence was fixed to the arms and the *body* was what moved.

It's a subtle difference and one that's hard to account for (unless one way was easier to make than the other), but the British method predominated in America and all subsequent American ploughs were made this way. However, it is interesting to note that when other types of metal planes began to be made in the middle of the century, whenever they were fitted with fences it was with the fence sliding on the arms in the European fashion and not the body, as did the wooden ploughs. To this day, combination planes and duplex planes like the Stanley #76 are made in the European fashion, although portable power tools that require fences, like electric routers and laminate trimmers, have reverted to the British system.

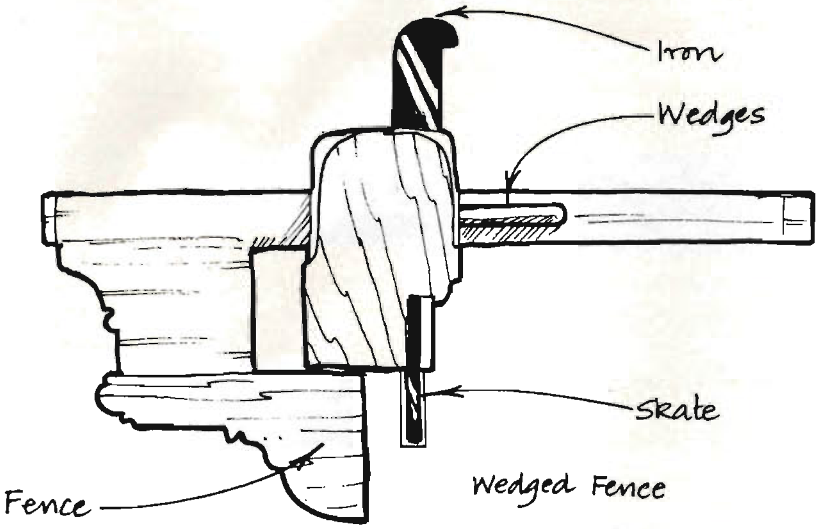
So much for the difference between European and British planes. What occurred next was the development of the so–called Yankee plough. This was actually less of a development than a simplification, for the native Yankee model was in many respects a cruder example of its British ancestor. The first British ploughs were undoubtedly either brought over directly from Britain or made in America by British–trained planemakers. But in the eighteenth century there were periods of such rapid economic expansion that often there was less time for refinement than for simply getting the job done.

While important cities like Boston and Philadelphia had their share of highly trained and gifted cabinetmakers who could either import or demand the very best tools available, out in the country refinement gave way to a no–nonsense practicality. Consequently, well into the nineteenth century there existed a more down to earth version of the plough characterized by a somewhat greater length, square arms instead of threaded arms (upon which the body was secured either by thumbscrews or – even more simply – just by wedges), and by a fence which was the same length as the body – in distinction to the British form which possessed a fence that extended beyond the body.

In time, however, the Yankee plough was superseded by the British model, and it was this latter type which then received so much attention that it became the veritable prince of hand tools.

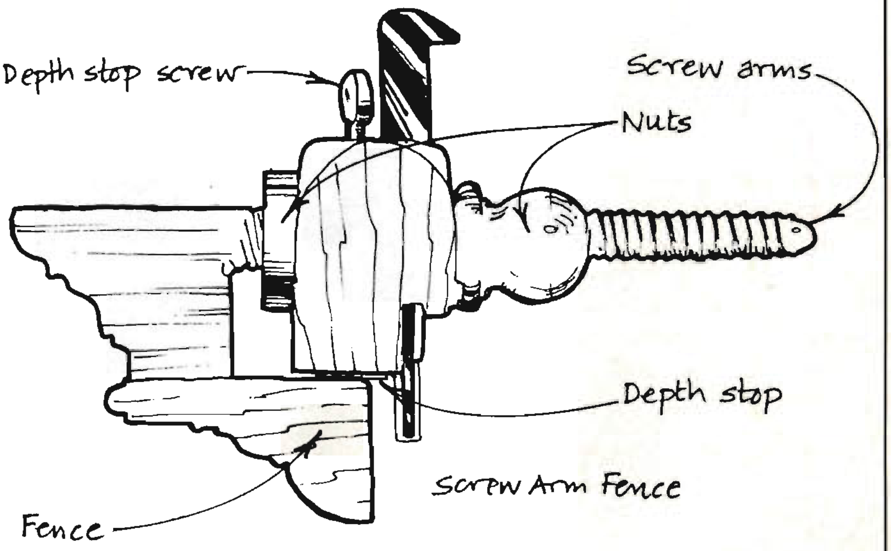
The basic model was anywhere from 7-1/2" to 9-1/2" long, the average being closer to 8". Cheaper models had the arms secured with thumbscrews, but the majority had threaded arms which were adjusted with large, turned, knoblike wooden nuts on the right hand side of the body and flatter, washerlike wooden nuts on the fence side of the body. The fence was attached on the left of the body and the shavings were consequently thrown out on the right–hand side – on top of the work or bench – in distinction to rebate planes whose mouths are cut on the left hand side, thereby throwing the shavings *off* the work. The plough is, however, the only other wooden plane that has the distinctively shaped mouth usually associated with the rebate plane.

The fence, while being made square with the back of the stock, invariably projects about 1–1/2" in front of the stock and is one of the more noteworthy aspects of the tool. Because it is wide (in order to provide a firm base for fixing the ends of the screw arms) and because it is also deep (in order to provide a substantial fence with which to bear securely against the work being grooved), it would be a hefty piece of wood indeed were it not rebated at its bottom left edge. It is this rebating, which was effected with numerous mouldings both at the side and at the

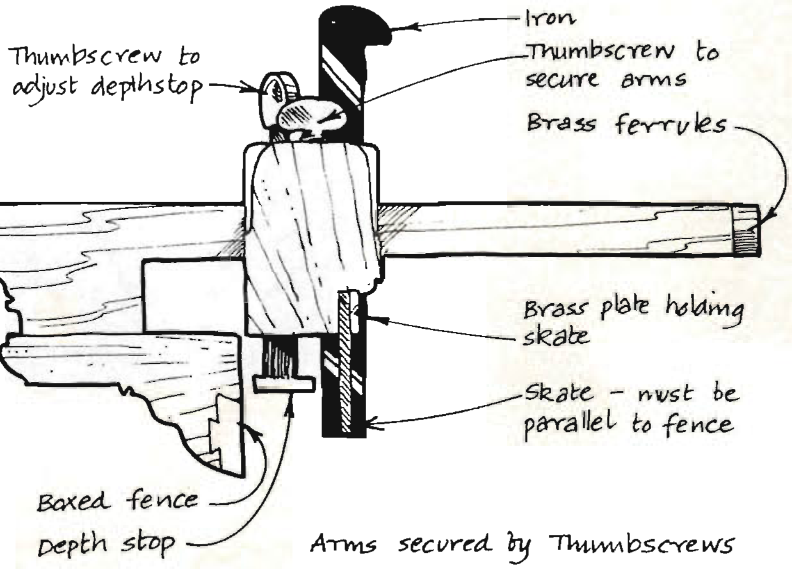


Wedged Fence

Rear View



Screw Arm Fence


Thumbscrew to adjust depthstop
Iron
Thumbscrew to secure arms
Brass ferrules
Brass plate holding skate
Skate – must be parallel to fence
Boxed fence
Depth stop

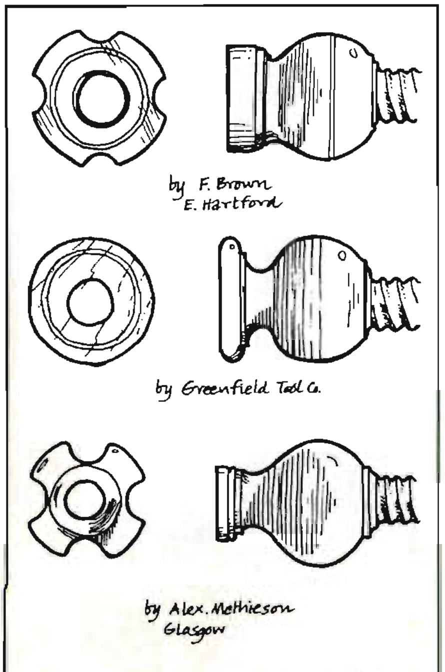
Arms secured by Thumbscrews

illustrations by the author

front edge, which helps make the plane look so ornate. The underneath of the screw arms are similarly moulded, and top–of–the–line models went a step further having the very ends of these arms ornately turned.

Beech was the commonest material used – as it was for all wooden planes, but for more expensive models, boxwood was used. Boxwood is much denser than beech so it wears much better, and is consequently better suited for parts like the threaded screw arms and the nuts which fit on them. So, naturally, these were the first parts to receive the improvements. For the more affluent consumer, still further refinements were possible. The fence, where it bore against the workpiece, might be boxed (that is, fitted with a dovetailed slip of boxwood) or even made totally of boxwood. Indeed, ploughs made entirely of boxwood are not uncommon. Ploughs made from more exotic materials, such as ebony and rosewood, are rarer since they were considerably more expensive.

Another area where the manufacturer's individuality was given free rein was in the design of the wooden nuts that secure the arms. There exist a remarkable number of patterns for these parts, each more delightful than the last, although the intricacy of wooden screw arms and nuts was certainly not the ultimate of plough design. For the truly top–of–the–line models, arms were made of brass or ebony and might run through steel bridles secured by steel or brass thumbscrews. Brass was also freely used as ferrules for the ends of screw arms, and as securing plates for the steel skates that were fixed to the bottom of the stock.



Various Locking Nuts and Knobs

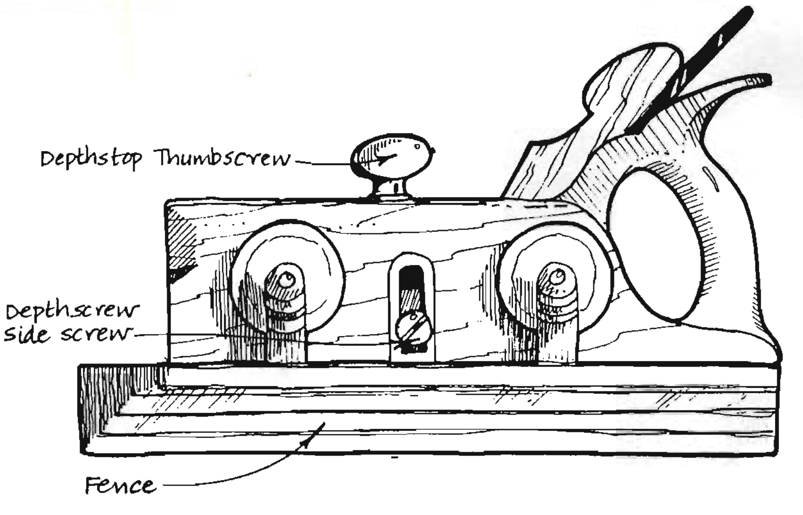
Usually the same length as the body of the plane, the skates sometimes extended beyond the front of the stock and were finished with a little upward curve like ice skates – hence the name. The skate is in two parts, and the cutting iron runs down through the body of the plane and rests against the forward edge of the rear part of the skate. The forward part is designed simply to guide the plane and control the depth of cut. The rear part is finished at its front edge in a V–shape, which fits into a matching V–shaped groove cut in the back of the iron. This is the one amazing instance of standardization to be found in the tool (all the other features varied so conspicuously from maker to maker): practically any plough plane iron will fit into practically any plough plane. Few other parts are ever interchangeable – nuts rarely fit screw arms other than those for which they were specifically made; wedges differ in shape and proportion from maker to maker, and skates are all of different lengths and widths. But irons nearly always fit. The reason for this singular act of consideration for the user on the part of makers otherwise apparently striving so strenuously to be unique, derives from the fact that few planemakers were also cutlers. It was common practice for most makers to buy the irons they needed for their various tools from edge tool manufacturers - most of whom, at least in the early part of the century, were located in Sheffield, England. Furthermore, irons would become worn down or lost and need to be replaced, so it is quite common to find ploughs with a collection of irons bearing several manufacturers' marks.

Despite the fact that irons were interchangeable, their sizing was variable, and although most ploughs were originally sold complete with a "set of eight" blades, not every "set" comprised the same widths. They generally range from 1/4" to 1" (or slightly more) graduated in 1/8" increments. This variation turns out to be an advantage to the user since, over time, as one accumulates extra sets, partial sets, or even individual irons, the range of grooves that may be cut in one pass is greatly increased from the original eight. Of course, any size groove can be made by simply plowing first one width and then readjusting the fence as needed to cut a wider groove with a second pass of the same iron.

Most ploughs are fitted with depth stops, and these too range from the severely practical to the decidedly ornate. The simplest form is a wooden stop, wedged down through the stock. Better was the brass screw which operated a steel shoe that emerged from the sole of the stock. In these an appropriate space was mortised out of the fence so the depth stop could be lowered even when the fence was set tight up against the stock. Top–of–the–line models additionally included a brass set screw in the side of the stock which, when tightened, secured the depth stop from any inadvertent readjustment.

One more frequent improvement was the incorporation of a handle into the stock – which goes a long way to refining the balance of the tool and making its use even more comfortable. Beyond this improvement were many other luxurious features, such as brass inlays around the screws that secure the arms to the fence, ivory ferrules and inlays, and amazing devices for ensuring that the fence remain constantly parallel to the body when it is being moved in or out. At least one manufacturer – Alexander Mathieson & Sons, Ltd., of Glasgow, Scotland – offered extra stops and skates to enable the plough to handle circular work.

Just to own one of these wonderful tools is pleasure enough for most woodworkers with any sense of appreciation for tools or wood, but to own one and use it is truly a treat. There are times when you may not have any electricity or just don't want to reset the table saw or use the router, and it is a fine thing to be able to reach for the plough and cut a groove with no fuss. If you want this option, there are some points to bear in mind before pressing the venerable plough into service.



Side View of Handled Plough

illustrations by the author

Firstly, of course, the stock of the plane should be sound, together with its wedge. It doesn't matter how grey or dirty it may appear, nor how rusty the skate may be, but check that the skate and the fence are parallel – that is, that both sit absolutely vertically. The skate may be off because it has been bent, or more likely because the stock has warped and skewed the skate along with it. Then the fence may be out of vertical alignment, either because it too has warped over the years or because the screw arms are bent or too loosely attached to the fence. You will not be able to use it successfully and with ease if the skate and the fence are not in the proper relationship to each other. Other defects may be more noticeable such as chipped threads on the arms or even checked and cracked securing nuts, but they are not as important.

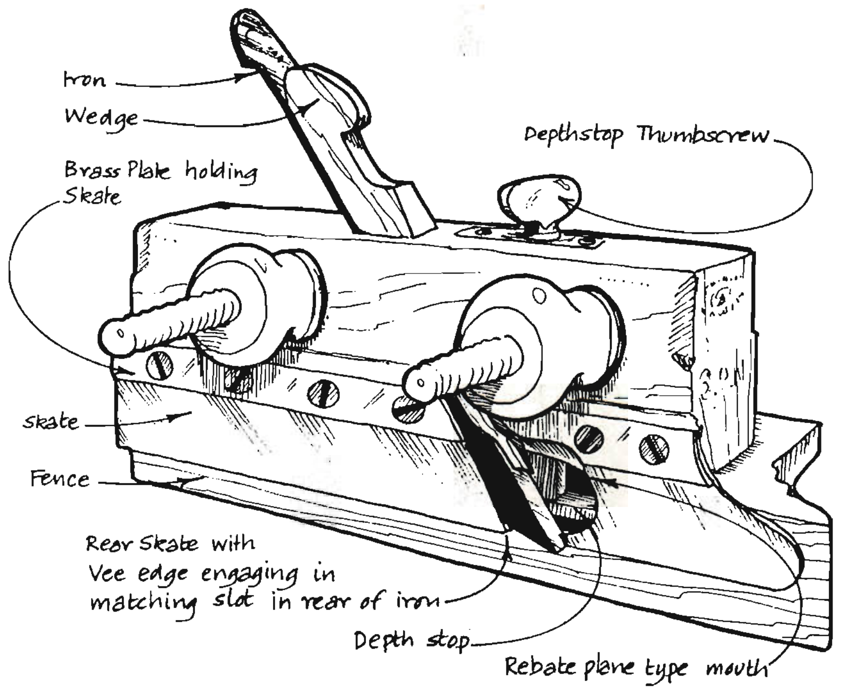
A little wax on the threads, a little minor disassembly and lubrication of the depth stop, and of course an immaculately sharp iron with a bevel of about 45°, set barely below the level of the bottom of the skate, and you are ready for action.

Loosen the large, outer nuts first and move the fence to the required distance from the iron, taking great care to keep the skate parallel to the fence by measuring at the front and the back (unless of course you have a plough with a center adjusting wheel or other built–in device to ensure parallelism between fence and stock). Then secure both nuts on each arm to lock the fence into position. Excessive force is not needed, just enough so there is no side play on the arms. Finally, set the depth stop, and start cutting.

In use, the only points to remember are to keep the plane perpendicular to the work and to keep the fence pressed tightly up against the work. If this last point is relaxed, you may find that the groove you are ploughing will wander away from the line. It sometimes helps, in order to avoid this difficulty, to start planing at the far end of the work first, working from a point further back each time until the whole groove is begun, and then continue with each pass commencing at the near end of the work. This way the plane iron is led into a previously cut groove and is prevented from wandering off into uncharted territory.

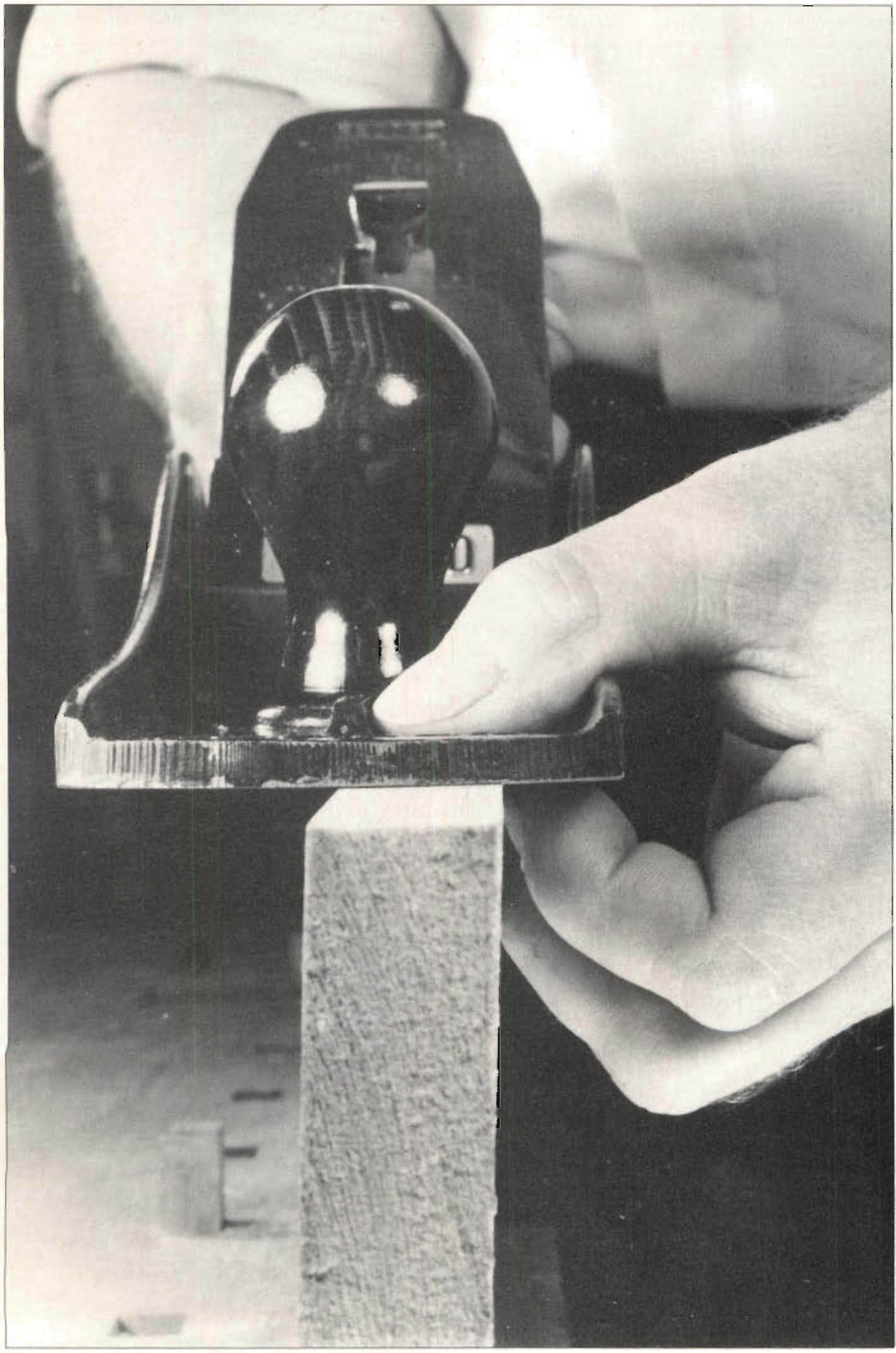
As I mentioned before, grooves may be cut wider than the width of any irons you have by readjusting the fence a little further each time. You will find it easiest to start any such multiple groove with the setting furthest away from the edge and progress *towards* the edge, rather than away from it. The logic behind this is that it leaves you more support as you widen the groove.

The plough was commonly the most cherished tool in the toolbox and the one of which the woodworker was proudest. With a little understanding, it can become one of your proudest possessions too. PW


Iron
Wedge
Brass Plate holding Skate
Depthstop Thumbscrew
Skate
Fence
Rear Skate with Vee edge engaging in matching slot in rear of iron
Depth stop
Rebate plane type mouth

Showing the Skate and the Mouth

PREPARING STOCK BY HAND



photos by Geoffrey B. Platts

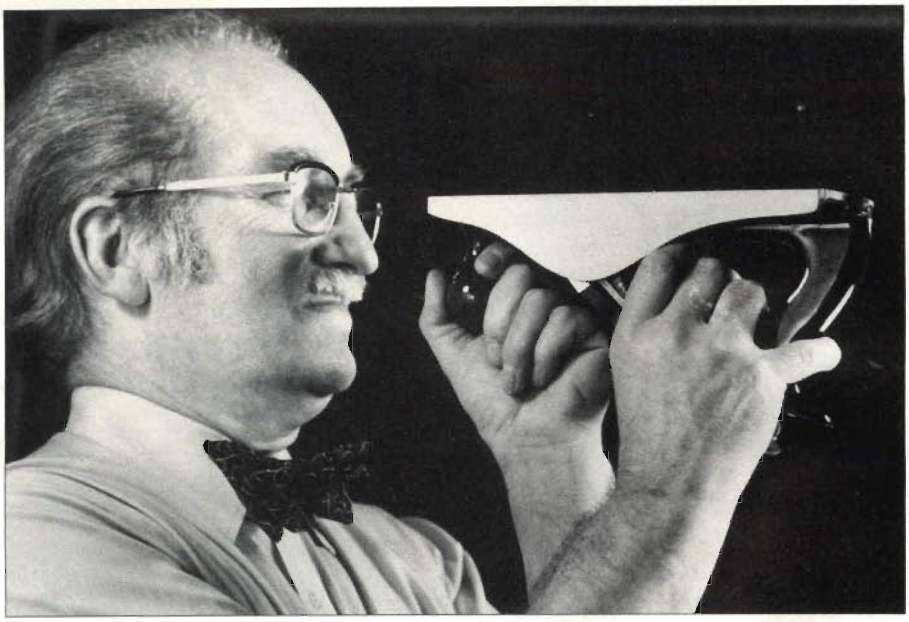
by John Sainsbury

For many woodworkers, a planer and jointer are luxuries that neither shop space nor wallet can afford. In spite of the popularity of these machines for timber preparation, the work can still be carried out on the bench using hand tools which have been correctly maintained and adjusted. What you will need is a jack plane about 14" long and a jointer plane about 24" long to use on longer pieces and for edge jointing.

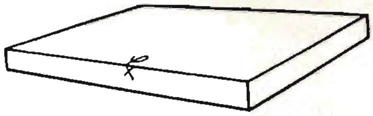
To test the wood for flatness, particularly in wide boards, you will need two winding strips; these are laths made of long, straight, and even-grained hardwood, planed very accurately to an exact width, and perfectly straight. An accurate try square, and a quality marking gauge will help to mark out and test the work as you proceed.

Attention should first be made to the condition of the tools. A well-sharpened cutter for the plane is a prime necessity, and the setting of the cap iron should be quite fine. Adjust the plane so when you look along the sole of the plane, only a fine black hairline of a cutting edge can be seen. It will be helpful to occasionally rub the sole of the plane with wax (a candle is fine for this) to make the plane glide smoothly over the timber.

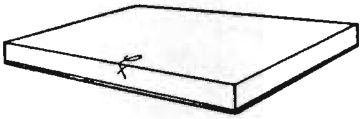
***John Sainsbury** is the founder of the Studio for Woodcraft where he teaches students from around the world. Among his many books are* Planecraft - A Woodworker's Handbook *(Sterling Publishing Co.).*



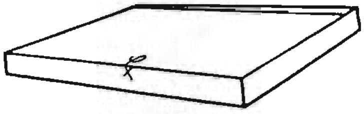
Adjust the cutter depth to take a very thin shaving.



Mark the good face and edge.



Scribe the thickness by referencing from the good face.



Scribe the width by referencing from the good edge.

Illustrations by the author

Be sure that the spur of the marking gauge is fine and sharp.

Remember to keep the bench free from shavings and chips which can mar the finely finished surface, and remove surplus tools and pieces of timber.

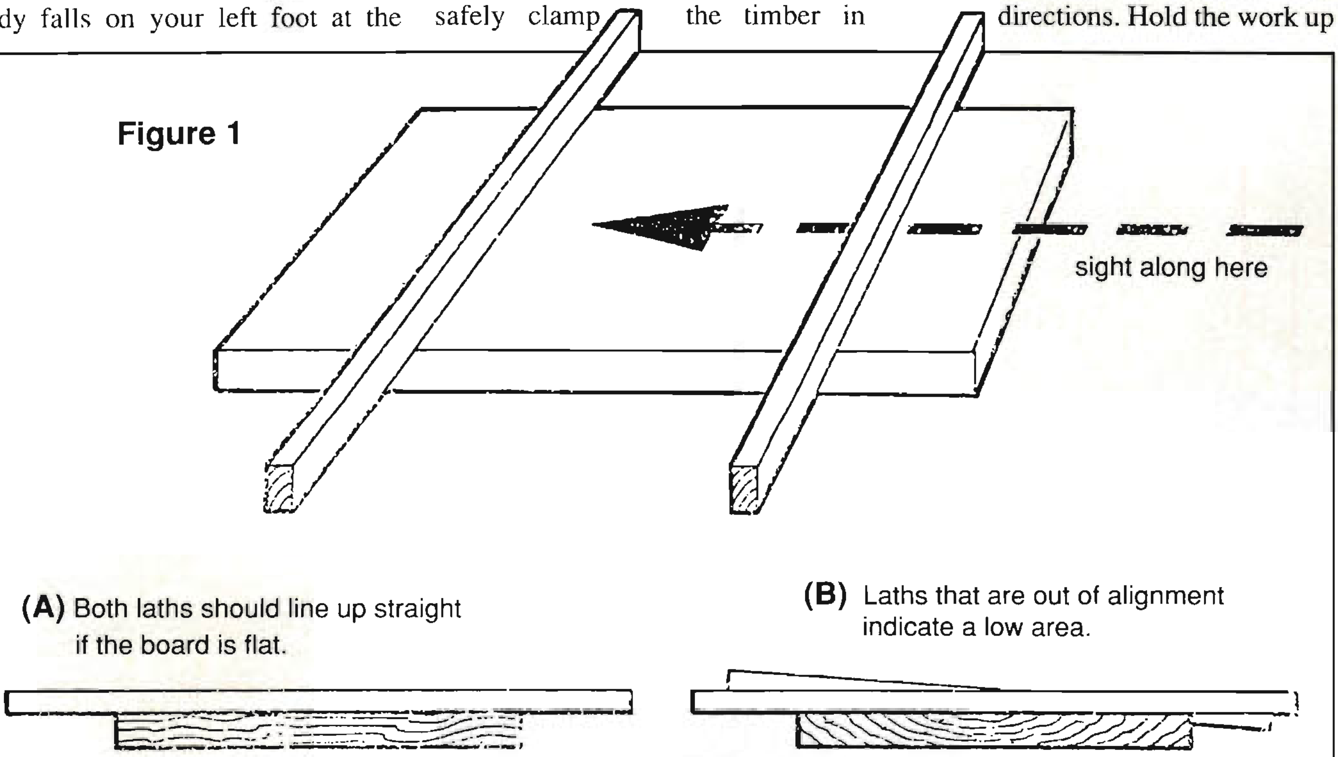
Stand comfortably when planing, fairly close to the bench with your left foot pointing forward (if you are right-handed) so the weight of your body falls on your left foot at the completion of the cut. Press down on the forward knob at the start of the cut and on the rear handle at completion. This will eliminate a common fault in planing - that of the surface falling away at one or both ends to produce a convex surface.

If you are fortunate enough to use a bench fitted with a dog vice at the right-hand end and dog slots across the bench top, then set the dogs to safely clamp the timber in place. If the bench is fitted with a bench stop only at the left-hand end, raise the stop to a position just below the thickness of the timber to be planed.

To begin stock preparation, first select the better of the two surfaces and plane, taking long strokes to bring the surface to smooth flatness.

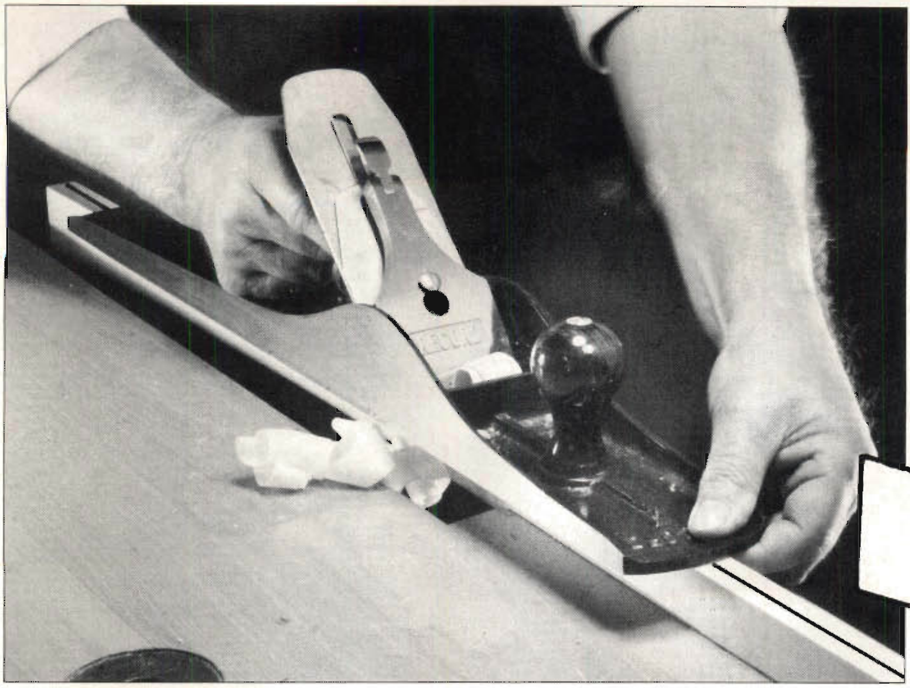
Use one of the winding strips or the try square to test for flatness in all directions. Hold the work up

Figure 1



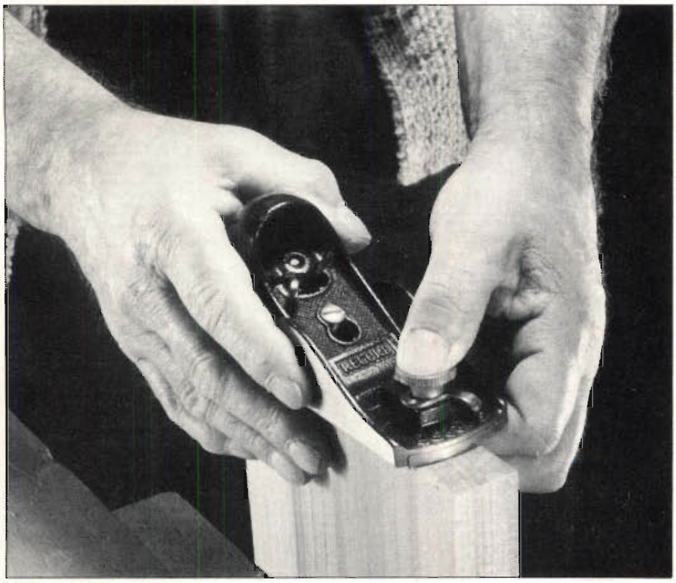
(A) Both laths should line up straight if the board is flat.

(B) Laths that are out of alignment indicate a low area.



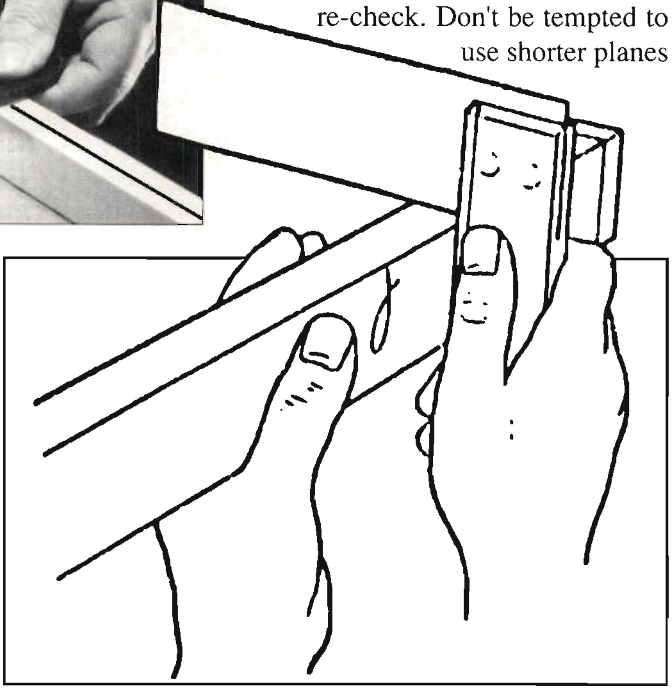
Use a long jointer plane to smooth the edges of boards. Wrap your fingers around the sole of the plane to guide it along the wood.

A block plane is best for planing end grain because its low cutting angle slices through the fibers more easily.

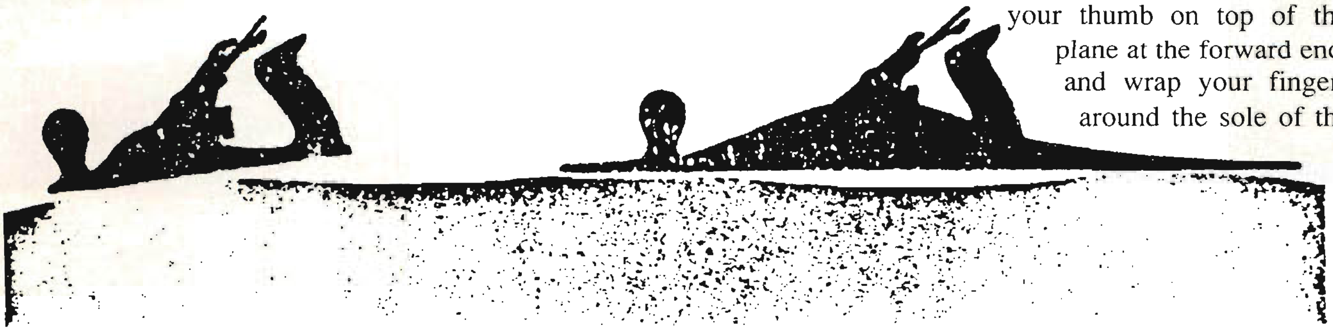


photos by Geoffrey B. Platts

to the light. If there is no light showing between the straight edge and the board, then the board is flat. In wide boards some areas may be planed lower than others, indicating a twist. To check for this, lay the two winding strips across the board and sight along the line indicated by the arrows in Figure 1. If there is no wind, the strips will line up perfectly as in Figure 1A. Any change from this will be indicated as shown in Figure 1B. Correct the planing as necessary and re-check. Don't be tempted to use shorter planes to work off the convexity because they will aggravate the concavity at the same time; the long plane will only plane off the little hillocks until you have a perfectly flat surface.



When the face is perfect, mark it with a face mark. Now select the best edge, place the timber in a vice and plane this edge. It will be helpful, especially with thin boards, to place your thumb on top of the plane at the forward end, and wrap your fingers around the sole of the



A short plane will not plane a long edge straight. A long plane will bridge the hollows.

plane to guide it along the wood. Since this edge must be square with the face side, how you hold the plane to produce this condition is vitally important. Test with a winding strip for straightness in length and with the try square for squareness. Hold the stock of the square against the marked face and test along the length of the timber. When correct, mark it so, and place the stock of your tools on this edge when marking and testing the rest of the board.

Next, set the marking gauge to the thickness required. Hold the stock of the gauge firmly against the face, and push the gauge away from your body, trailing the spur to cut a fine line parallel to the face of the timber. You should see the spur doing its job - the mark need not be excessively deep. With a wide board it will be helpful to mark all four edges; with narrow boards, only the long edges.

Plane off the waste down to the line; be careful to sight the line periodically to be sure you don't overcut. Again test for flatness, just in case.

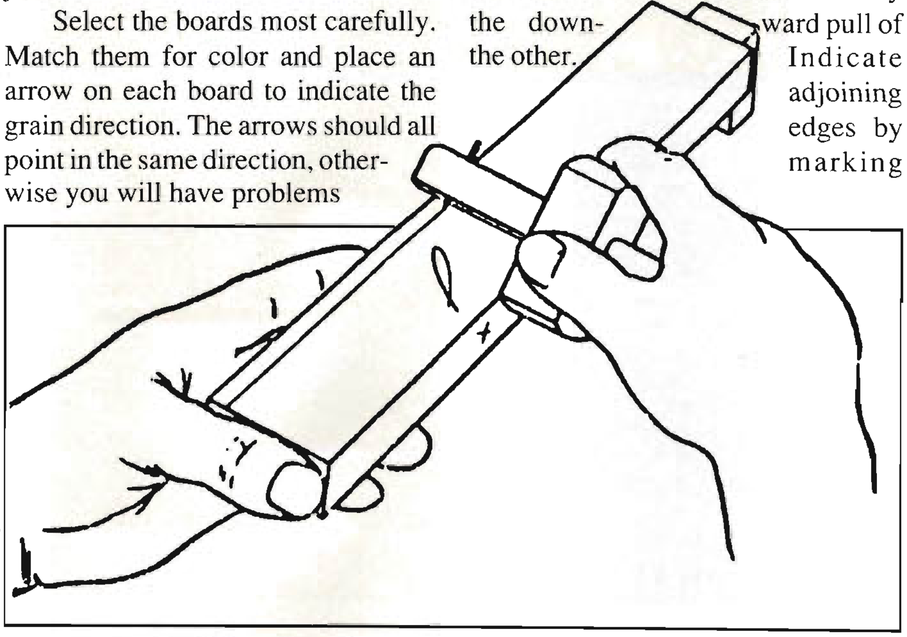
Finally, set up the marking gauge to the required width and carefully mark the width with the stock of the gauge held firmly against the face edge. Do this on both faces. Saw off the waste then plane to the line, checking occasionally with the try square.

The piece is now flat, edges are square with each other, and the board free from winding.

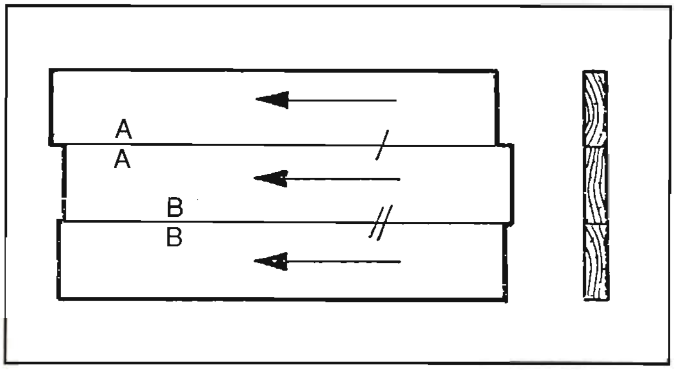
Making up Wider Boards

There will be many occasions when wide boards of a particular species will not be available and you will have to make up panels by joining narrow stock. The quickest and simplest method of joining edge-to-edge is to use the butt joint. Years back, this was often called the slape joint.

Select the boards most carefully. Match them for color and place an arrow on each board to indicate the grain direction. The arrows should all point in the same direction, otherwise you will have problems in planing the faces when the narrow boards are one. Arrange the wood so the heart side of each board will alternate with the one next to it. Should there be any warping of the boards after gluing, the upward movement of one will be counteracted by the downward pull of the other. Indicate adjoining edges by marking the boards on the face side.



Illustrations by the author

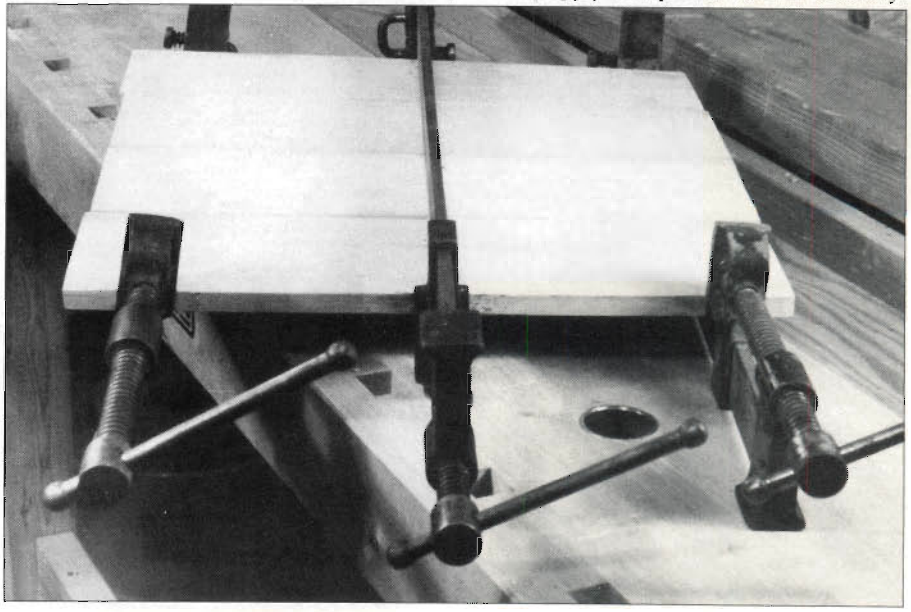


To make up larger panels, glue boards edge–to–edge with the grain running in the same direction and the growth rings alternating.

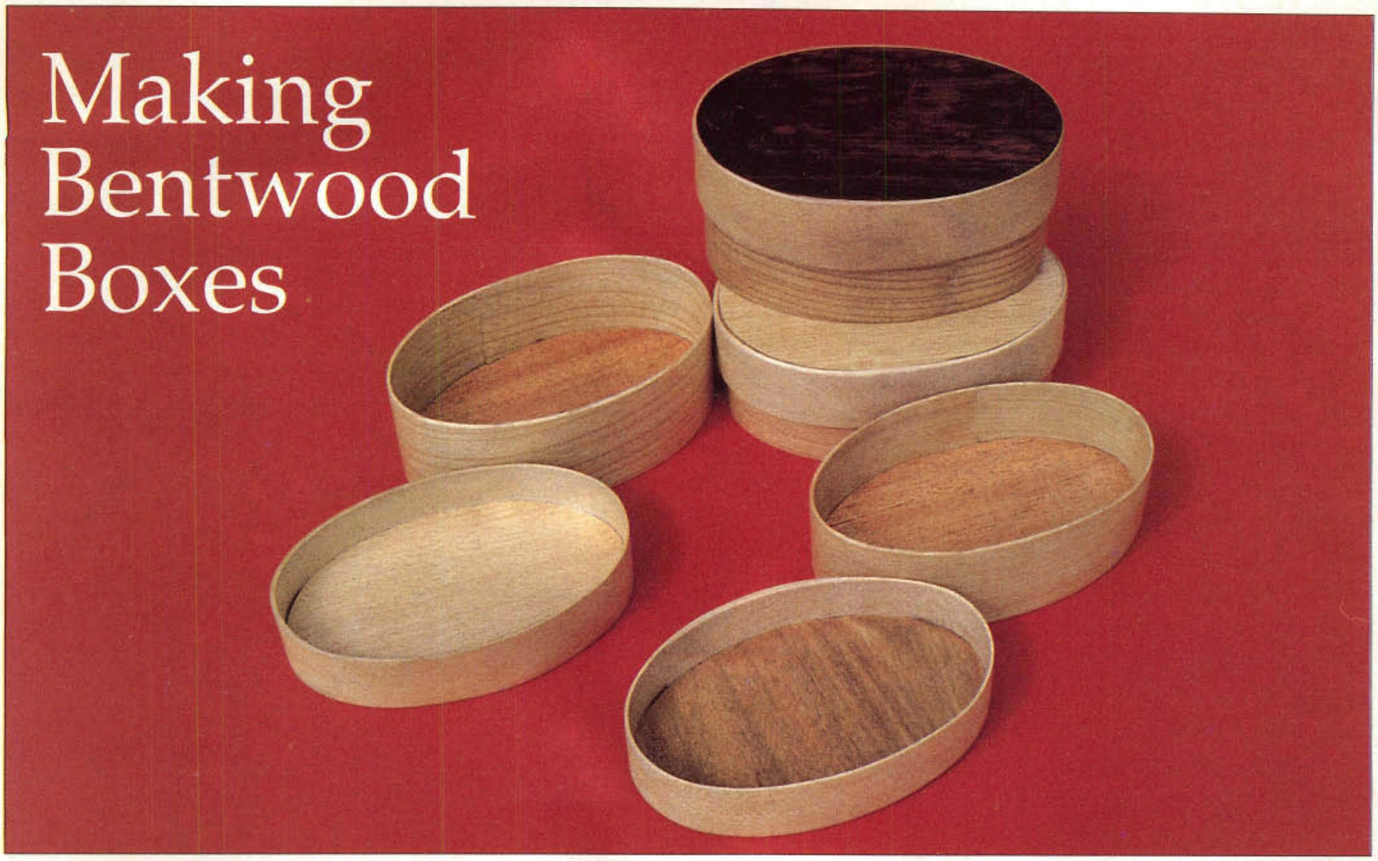
Apply glue to all mating edges and clamp the panel, alternating the clamps top and bottom for even pressure. Wipe off the excess glue and see that the clamps are also free of glue, otherwise they may stain the timber.

There are no shortcuts, but the work can be most pleasurable and the end result very satisfying. PW

Position clamps so they apply even pressure to the assembly.



Making Bentwood Boxes



by Warren Asa

Prehistoric man bent wood to form canoes, kayaks, and snowshoes. This process is still used today to make these items, as well as in the production of furniture, boats, and other sports equipment. Bentwood boxes offer you a modest start in this fascinating field. These boxes are light and strong, ideal as jewelry boxes, but can be put to many other uses. They require only four pieces of wood and are great for using up the many beautiful small pieces that accumulate in every shop.

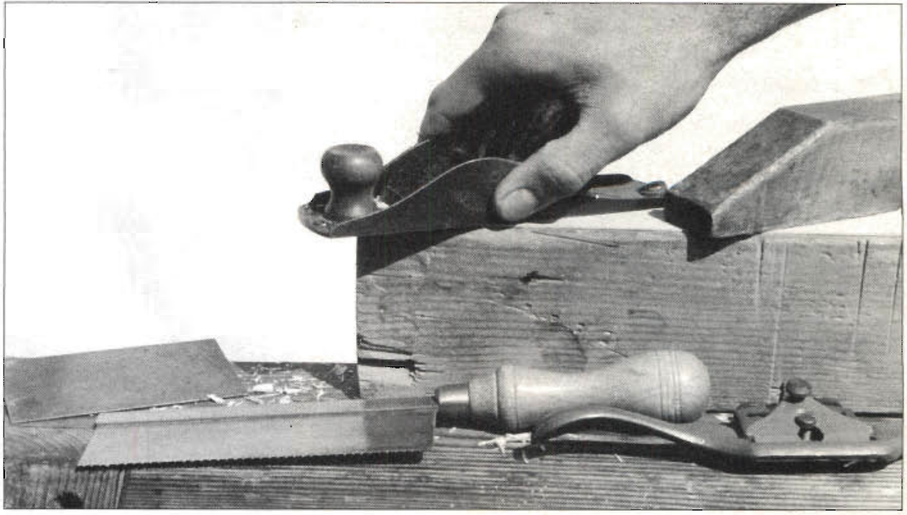
First you must decide on the shape for your box. I prefer an oval, but any shape from round to pear is possible. Lay out a cardboard template for the bottom. The bent side piece that will wrap around the bottom needs to be 2"– 4" longer than the circumference of the bottom so the ends can overlap. The small box shown here has an overlap of 2". The box lid should be somewhat larger than the bottom. Its exact size will depend on the thickness of the side piece you use. I usually make the lower portion of the box first and then cut the top to fit.

Start work on your box by bandsawing the bottom to its general shape and then sanding it to finished size on a disc sander. Sand its top and bottom too.

In my opinion, the best North American wood for bending is ash, but white oak, holly, hickory, elm, beech, maple, birch, and cedar can all be used. Be sure the wood is quartersawn with straight grain and has no hint of knots or flaws. In the box shown here, ash was used for the bottom side and holly for the lid side. I use a hollow–ground, thin–kerf carbide blade to saw the sides. For boxes that are more than 6" in diameter, the side should be about 1/8" thick. For smaller boxes, 1/16" to 3/32" will bend more easily. After sawing, I scrape the piece to remove any saw marks and then, with a spokeshave and a block plane, I taper both ends. Plane the tapers on opposite surfaces so they mate when wrapped around the botom. To support the thin piece during this operation, clamp it to the edge of a plank as shown in the photo below.

Warren Asa has been whittling and woodcrafting since his Scouting days. He specializes in native American folk craft.

Clamp the side piece to the edge of a plank while planing the tapers on the ends.



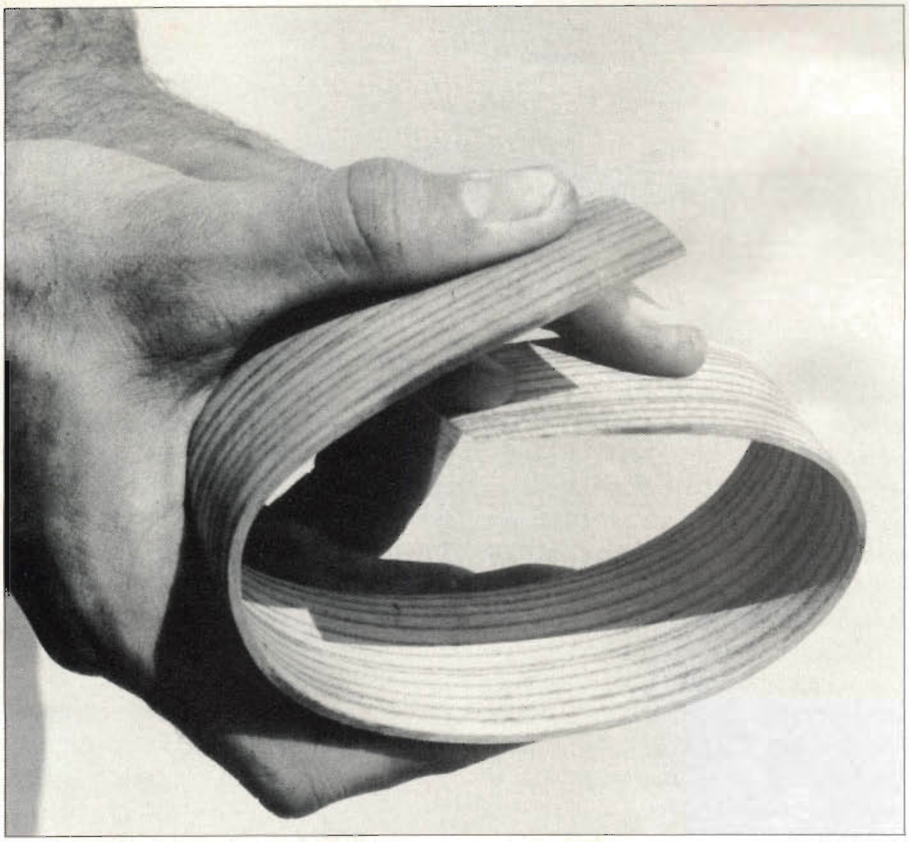
photos by the author

don't glue the spacer in place.

The lid has to fit over this lower portion, so figure its size accordingly. Naturally you want a snug fit. I like to use fancier woods for the top. The dark lid in the photo (far left) is cocobolo. Its red-brown color contrasts nicely with the holly.

I start sanding with 80–grit paper on a disc sander and work down to 400–grit by hand. The top of the lid can be given a slight convex shape if you like. This box was finished with Danish oil but there are many other possibilities. For example, they can be tole painted with fruit and flower designs popular in Penn Dutch crafts. These can be done freehand or with stencils over the natural wood or over a solid color. Another possibility is to inlay the top with bone, shell, leather, or a slab of semi–precious stone. The bone can be decorated with scrimshaw and the leather can be stamped or tooled. Sometimes I cover the bottom of a box with sheet cork, or line the inside with felt.

I find these boxes so easy to make that I turn them out in quantity as gifts. The only time-consuming step is the soaking, and that can be done in the night or during the daytime when you are at work. By following this procedure, you can bend each evening and start new pieces soaking for the next day's bending. Once you have accurately established the size of your pieces, you can saw a number of bottoms, tops, and sides at the same time. **PW**



A soaked piece of ash being flexed into shape

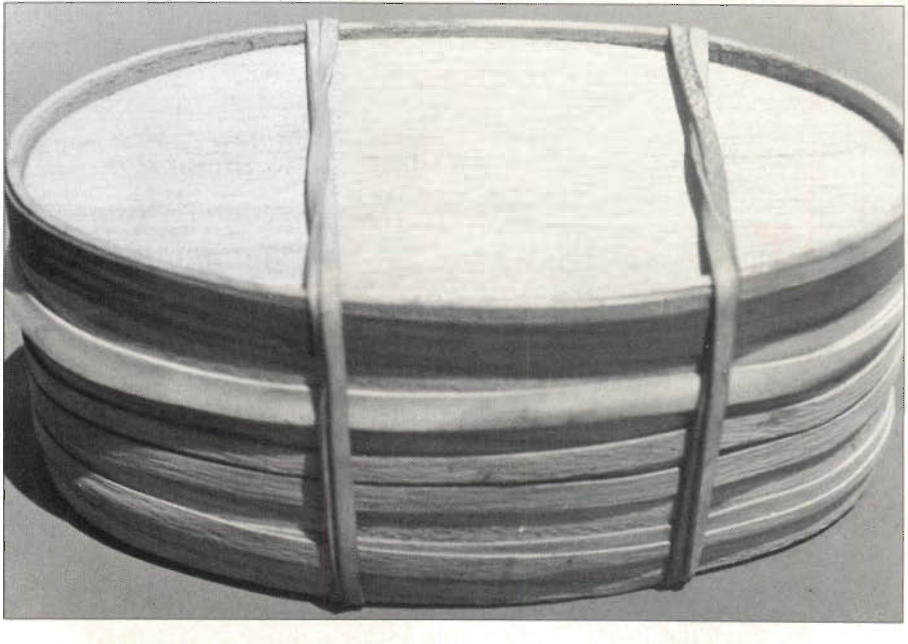
A steam box is not necessary for light bending of this kind. I use a sink or bathtub and soak the pieces in hot water for 10 to 12 hours. Use the hottest water possible and weigh down the wood with some nonstaining item. Before bending, renew the hot water, soak them for another hour, and repeat for one more hour. If your wood appears to be quite flexible after the third soaking, proceed; if not, soak it in a fresh tub of hot water. Most pieces will bend moreeasily in one direction than the other, so naturally that's the way you want to bend yours.

Dry the piece and carefully bend it around the bottom. Use a second bottom piece as a spacer to keep the sides parallel. Fasten the side in place with strong rubber bands or surgical tubing and allow the wood to dry for 24 hours. You may need to use a clamp to pull the flat area in if you use an oval design.

Here are some troubleshooting suggestions: if your wood breaks or splinters when you bend it, soak the wood longer in hotter water. Try bending the side piece *partway* after one or two soakings, and tie it into a horseshoe shape; then soak it again. Repeat this until you are sure it can be bent around the bottom piece. Check for flaws – such as knots – which will almost always cause problems. Try scraping the wood a bit thinner, or try a different wood.

The next day, remove all the rubber bands and apply white glue to the bottom edge and to the overlap on the side piece, and again fasten the side in place with rubber bands. Wipe up any excess so you

Bend the side piece around the bottom and hold in place with rubber bands. Use a second bottom piece as a spacer.



Gift Project

HEATHER'S DESK

by Ron Holladay

This project was one I put off for a long time until my four–year–old daughter, Heather, put the heat on. So for Christmas I built it for her.

The legs (A) and feet (B) are joined together with a pegged mortise and tenon. I had never tried doing a mortise and tenon joint before because it seemed kind of hard. As it turned out, this was the most satisfying part of the project. I started by cutting the parts to size (the dimension in the cutting list includes the tenon). On the bottom edge of each leg I cut a 1" long tenon with 1/8" shoulders all around. This can be accomplished with a table saw, but I chose the more traditional method and used a back saw. Take the feet (A) and mark a 6-1/2" X 1/2" mortise on center, then chop out the waste with a chisel and mallet. (For more information on mortise and tenon joinery, see Issue #30, April/May 1986.) Dry–assemble to make sure the fit is right.

Use a compass to draw an arc at the top on each end of the feet. With a band saw or coping saw, cut the arcs and sand out the blade marks. To locate the hole for the through–dowels, measure in 5-1/4" from each end of the feet and 7/16" from the top. Drill a 3/8" hole and install dowels with glue. I used 3/8" diameter walnut dowels to contrast with the oak. Cut them oversize so you can sand them flush.

Now cut the two sides (C), front (D), and back (E) to size. (Rip the front to final width with a 10° bevel on the top edge.) Then set up your router table to cut a 1/4" deep dado 1/4" up from the bottom using a 1/4" straight bit. Mark the two best outside faces of the sides (C) for a left and right side. To cut the slope, measure 2-1/2" up from what will be the bottom front edge on each side piece and 3-5/16" in from the back on both top edges. Draw a line between these two points and cut off the waste. Next, cut a 3/4" wide X 3/8" deep rabbet on both ends of the front and back pieces. Dry–fit the front, sides, and back with the bottom (F) installed. If the fit is right, glue and clamp.

The legs attach to the sides on the inside of the desk, so you need to cut some slots in the bottom for the legs to slip in. The slots are 3/4" wide X 6-3/4" long. Measure 6" from the front inside edge to locate the front of the slot. Cut it out with a coping saw or keyhole saw. Glue and screw the legs to the desk sides with countersunk 1-1/4" X #8 wood screws and cover the holes with button plugs. While the glue is setting, cut the leg brace (G) to size and install across the top of both feet at the back edge of the legs.

Cut the top (H) to size and use a core box bit to rout a pencil tray in the center. I made the lid (I) from oak plywood instead of gluing up a panel from solid stock. If you do the same, use iron–on edge banding or cut the panel smaller and use solid wood edging. Cut a 10° angle on the back edge, then mortise this edge and the mating edge of the top piece (H) for the hinges. Glue and attach the top

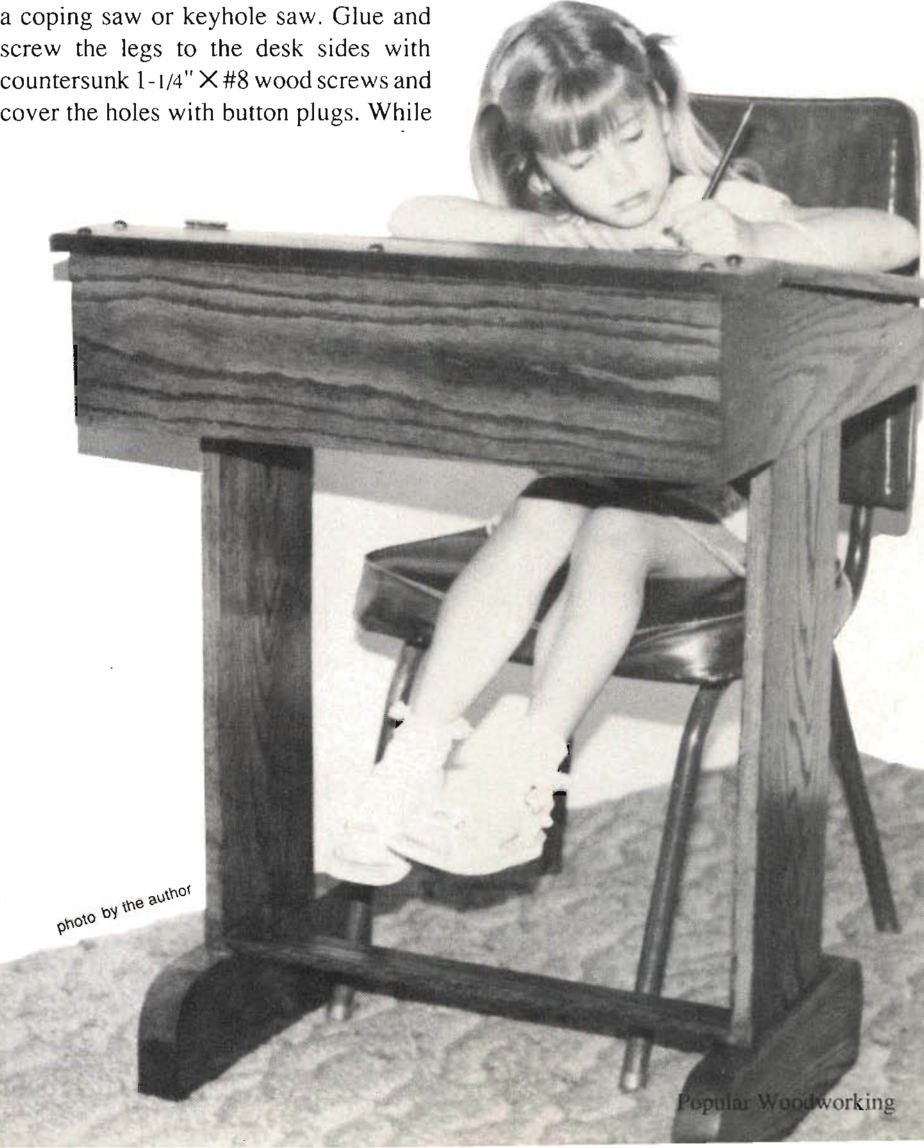


photo by the author

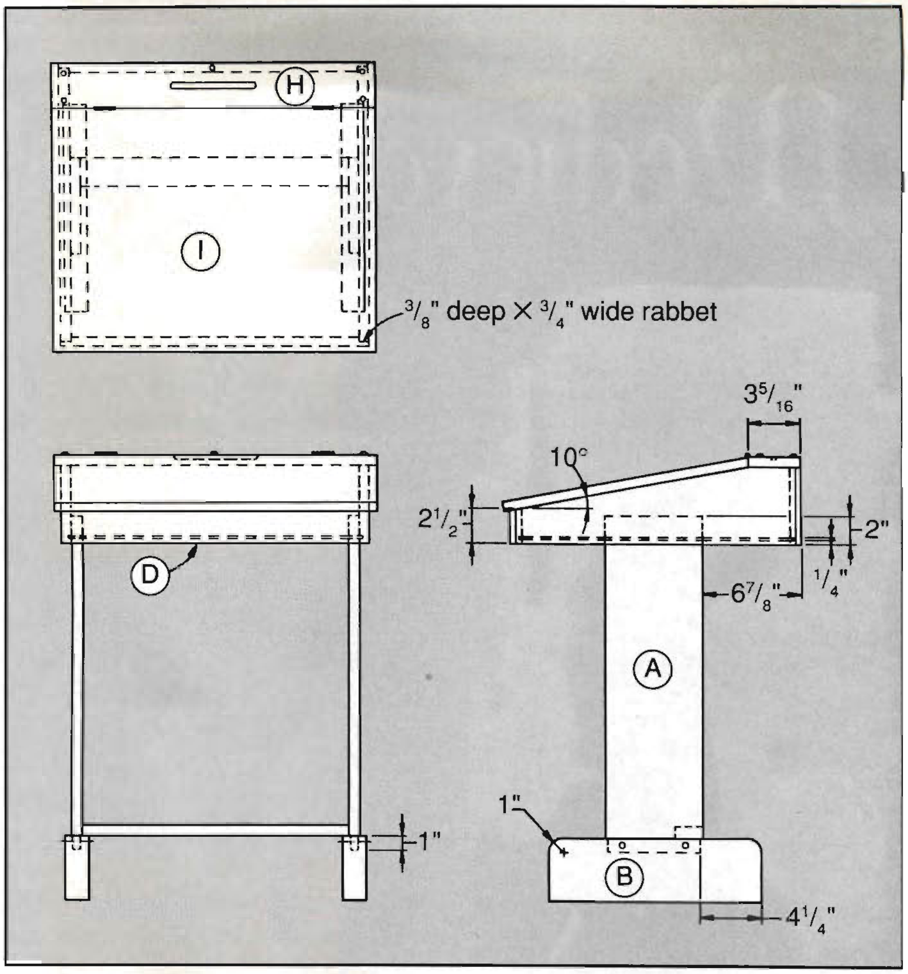
__Ron Holladay__ is a woodworker and writer from Oxnard, California, specializing in mantel clocks.

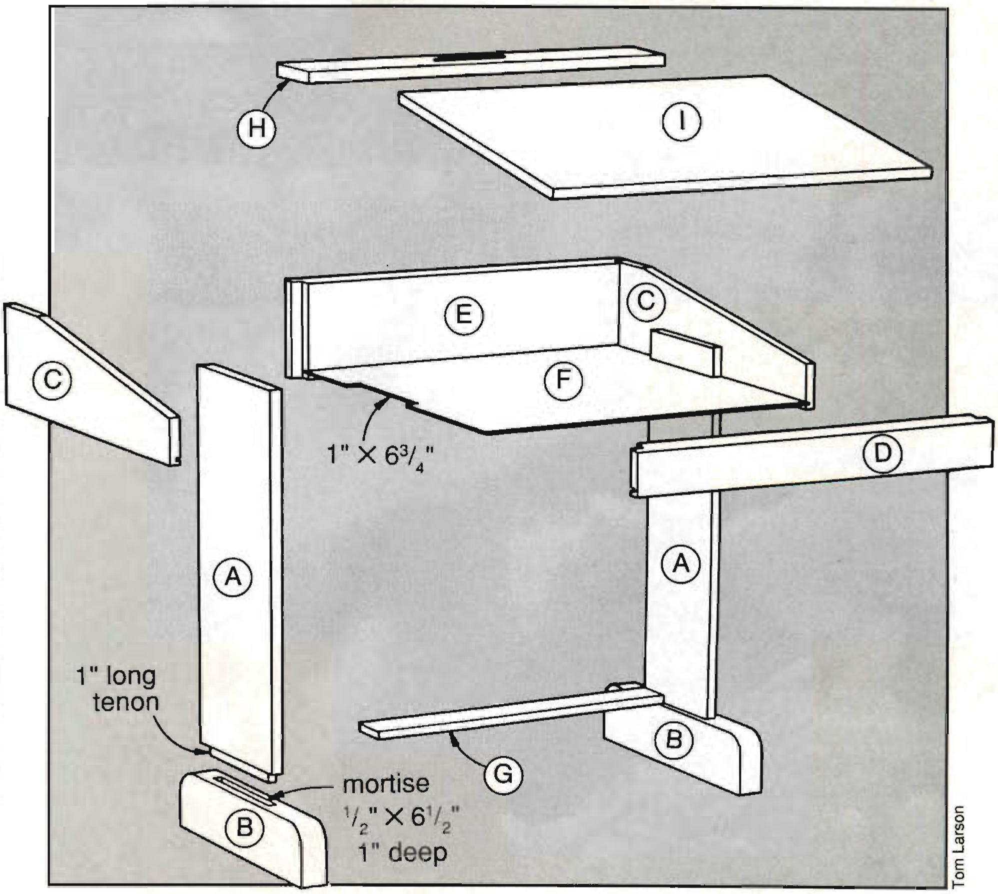
to the desk frame with countersunk 1-1/4" × #8 wood screws and, again, cover them with buttons. Now attach the lid and check the fit with the hinges installed. I installed a friction support to hold the lid open and to help avoid a sudden drop on little fingers. Remove the desk lid and all the hardware, and finish–sand the unit.

I put on one coat of dark walnut Watco® Danish oil. After 25 minutes wipe off the excess oil and let dry overnight. Buff any fuzzy edges smooth with fine steel wool. Then mix 2/3 Danish oil and 1/3 polyurethane varnish. Stir well and apply. After 10 minutes, wipe off the excess. The number of coats you put on will depend on the sheen and thickness of polyurethane you desire. Four coats was good enough for me. Install the lid, stand back, and admire your craftsmanship.

Take the desk to your little tot's room and hope they don't mark it up with crayons while you're still there; you'll probably cringe like I did. This project took three weekends to build and Heather thinks it was well worth it. PW

Heather's Desk					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	3/4"	6 3/4"	24"	legs
2	B	1 3/4"	4 1/2"	15"	feet
2	C	3/4"	5 1/2"	19 1/2"	sides
1	D	3/4"	2 1/2"	22"	front
1	E	3/4"	5 1/2"	22"	back
1	F	1/4"	19 1/2"	21 1/4"	bottom
1	G	3/4"	2"	19"	leg brace
1	H	3/4"	3 5/16"	22 3/4"	top
1	I	3/4"	17 1/2"	22 3/4"	lid
	Supplies				
9	1 1/4" × #8 flat head wood screws				
9	1/4" button plugs				
2	brass hinges with screws				
1	friction support				
	3/8" dowel stock				





Tom Larson

Medieval Bookbinding

Croft uses a froe and a maul to rive oak shakes for his bookcovers. He carved his maul from the root of a locust tree.

by Bill London

"Modern books are designed to fall apart. Today's hardbound books may survive only 50 years, " explains Jim Croft from the northern Idaho town of Santa. But the books he builds are designed to last at least 300 years using medieval techniques that became obsolete with the 17th century.

"We grow flax to spin into linen cord, make our own paper, and bark-tan the leather to create books made only from local raw materials, " he said.

His bookcovers, often carved and inlaid, reveal the same quality craftsmanship and attention to detail as did the medieval artisans. All his work is done with traditional hand tools and methods.

He begins with blocks of straight-grained oak. After splitting the wood with a froe into shakes about an inch thick, he roughly shapes each cover-piece with a hatchet. He then scrapes the block flat with a spokeshave holding the piece in a shaving horse (a foot-operated vise).

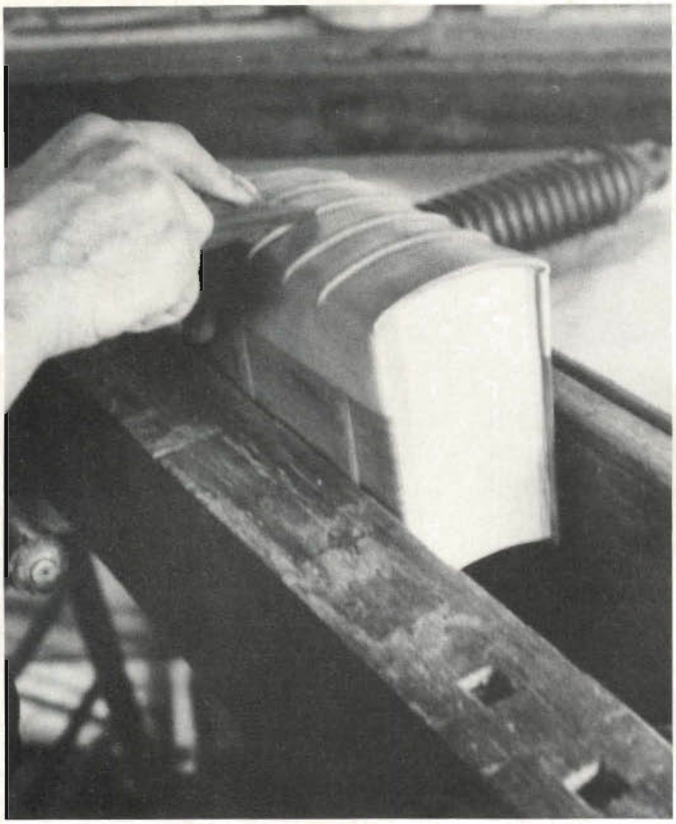
After a few hours of forming and scraping, each pair of covers is bound to its pages. Linen cords which bind the pages are laced through holes in the covers. After the cords have been pulled tight, pegged and pasted into place, they are cut flush with the cover. The book is then set in a vise where the pages are trimmed with a plough, and layers of silk, paper, and leather are glued onto the spine. Jim's books aren't complete until the covers are carved and scraped to perfection, and burnished with a stick of lignum vitae.

His least ornate books require a minimum of 20 hours to complete; the delicately carved and inlaid ones can consume 60 hours or more. These re-created medieval masterpieces are made with blank pages and sold for use as diaries, sketch books, and journals. Jim also restores and rebuilds old books for university and state library archives. In conjunction with the Northwest Conservation Center of Portland, Oregon, Jim will sponsor a conference on medieval bookbinding techniques at his Idaho workshop this summer.

Each of his books is a time machine that transports you back to the quiet, unhurried 15th century when talented artisans carefully cut and carved their masterpieces. Thanks to Jim Croft, this tradition has not fallen apart with time. PW

Croft sits at his shavinghorse and uses a spokeshave to roughly form the cover.

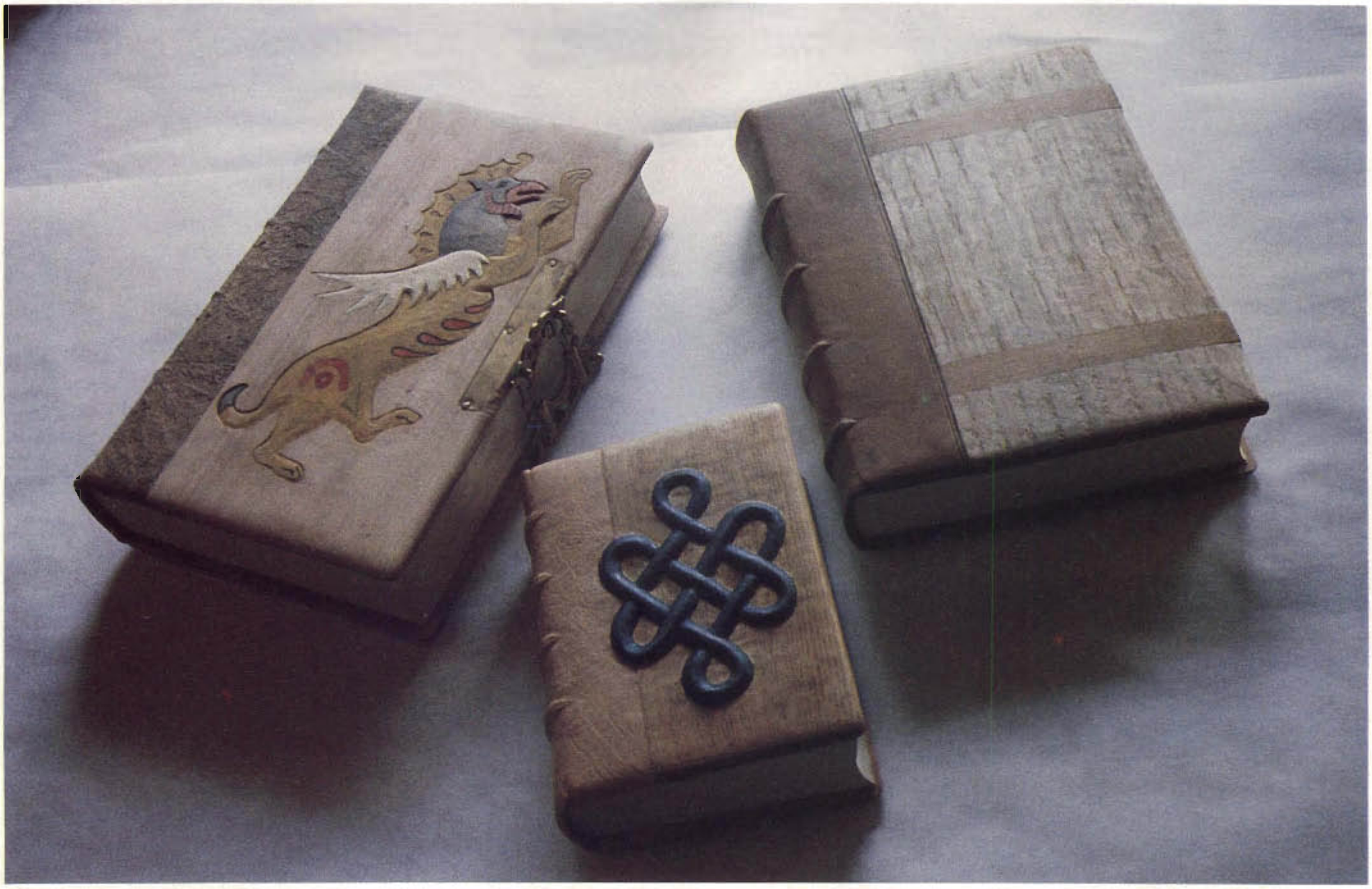
***Bill London** is a freelance writer from Moscow, Idaho, who, in his spare time, "plays at wood-mangling (from spoon carving to log home construction)."*

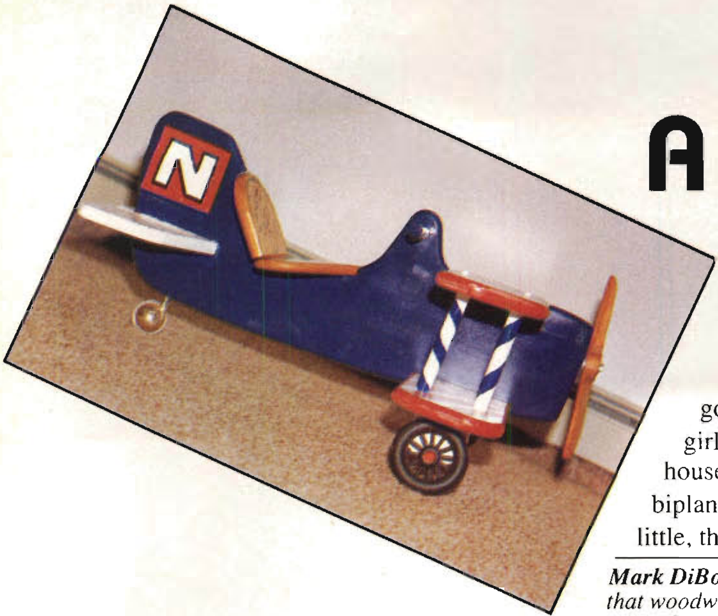


In his workshop, Croft burnishes the leather spine of a book.

He does the final scraping with a metal scraper he made from the bar of a chainsaw.

Using traditional tools and techniques, Jim Croft creates books that are truly exquisite. Even the hardware, like the brass clasp on the book below left, is handmade.





A Biplane Walker

by Mark DiBona

That ol' Red Baron's got nothing on my little girl. She zooms around the house on her own customized biplane walker. Since she's so little, the extra wide wheel base prevents loop-de-loops so she won't have to bail out and risk bumping her nose.

__Mark DiBona__ is a dentist who says that woodworking has been his serious hobby for years, and now he's designing and making some custom furniture.

I used pine for this project because, although adults appreciate the subtle beauty of stained hardwoods, junior pilots prefer bright primary colors and I intended to paint the finished product. I used oak, however, for the wheel struts (F) and blocks (G) to give them extra strength.

The front wheels of the plane are

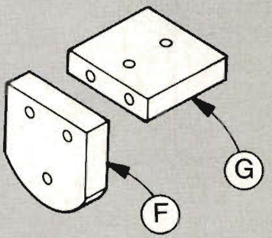
Biplane Walker

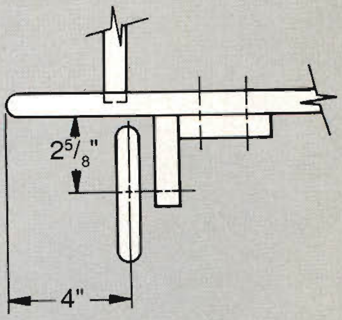
Cutting List

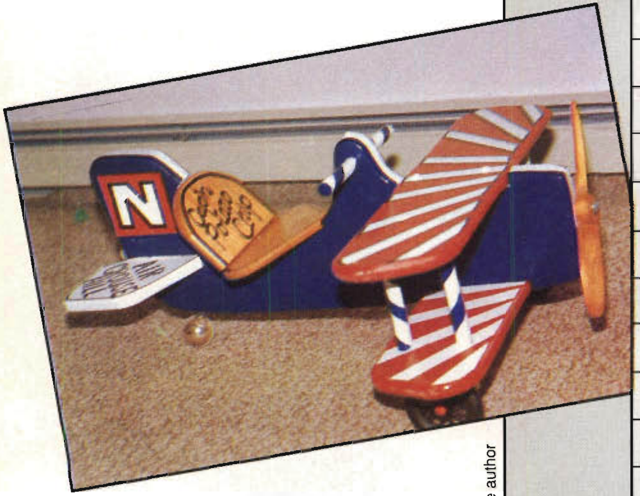
Qty	Part	Finished Size T	W	L	Piece
1	A	$1\frac{1}{2}$"	10"	28"	fuselage
2	B	$\frac{3}{4}$"	$6\frac{3}{4}$"	22"	wings
1	C	$\frac{3}{4}$"	$6\frac{3}{4}$"	12"	tail
1	D	$\frac{3}{4}$"	$5\frac{1}{2}$"	8"	seat
1	E	$\frac{3}{4}$"	$5\frac{1}{2}$"	6"	backrest
2	F	$\frac{3}{4}$"	3"	3"	wheel struts
2	G	$\frac{3}{4}$"	3"	3"	wheel blocks
4	H	$\frac{3}{4}$" diameter		$6\frac{1}{4}$"	wing struts
1	I	$\frac{3}{4}$" diameter		9"	handle
1	J	$\frac{3}{4}$"	2"	11"	propeller

Supplies

Qty	Item
2	$4\frac{1}{2}$" diameter wooden wheels
1	2" swivel caster
1	$\frac{1}{4}$" × 3" lag bolt
2	flat washers
	screws
	button plugs







photos by the author

4–1/2" wooden wheels available from *Woodcraft Supply Corporation*, Dept. PW127, 41 Atlantic Ave., Box 4000, Woburn, MA 01888. The back wheel is a Shepherd swivel caster.

To get this project off the ground, start by enlarging the squared drawings to make patterns for all the parts. Lay out the pattern for the fuselage (A) avoiding knots if possible. Cut out all the parts with a band saw or jigsaw and round over the edges with a 1/2" router bit. Don't, however, round the notches in the fuselage that will accept the wings (B), tail (C), seat (D) and backrest (E), or the wheel struts (F) and blocks (G).

Drill four 3/4" diameter × 1/2" deep holes in the underside of the top wing and the top side of the bottom wing to accept the wing struts (H). The hole locations are shown on the drawing below; drill carefully so they all line up. The fuselage will also need a 3/4" hole for the handle (I).

Dry assemble the biplane by screwing the parts in place. I used two 3" × #6 drywall screws to secure the tail to the fuselage. The rest of the assembly is put together with 1-1/2" × #8 wood screws. All screw holes should be countersunk; I used wooden button plugs to cover the holes, except for those in the seat and backrest, where I used flush plugs.

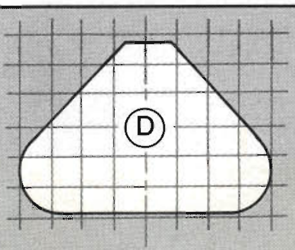
When you're sure it all fits together properly, take it apart and sand everything smooth, then give it all two coats of primer.

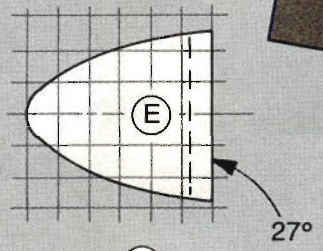
I did the paint job using non-toxic enamel spray paints, starting with the lightest colors and using masking tape and newspaper to create the design. Customize your own design for your junior pilot – the sky's the limit.

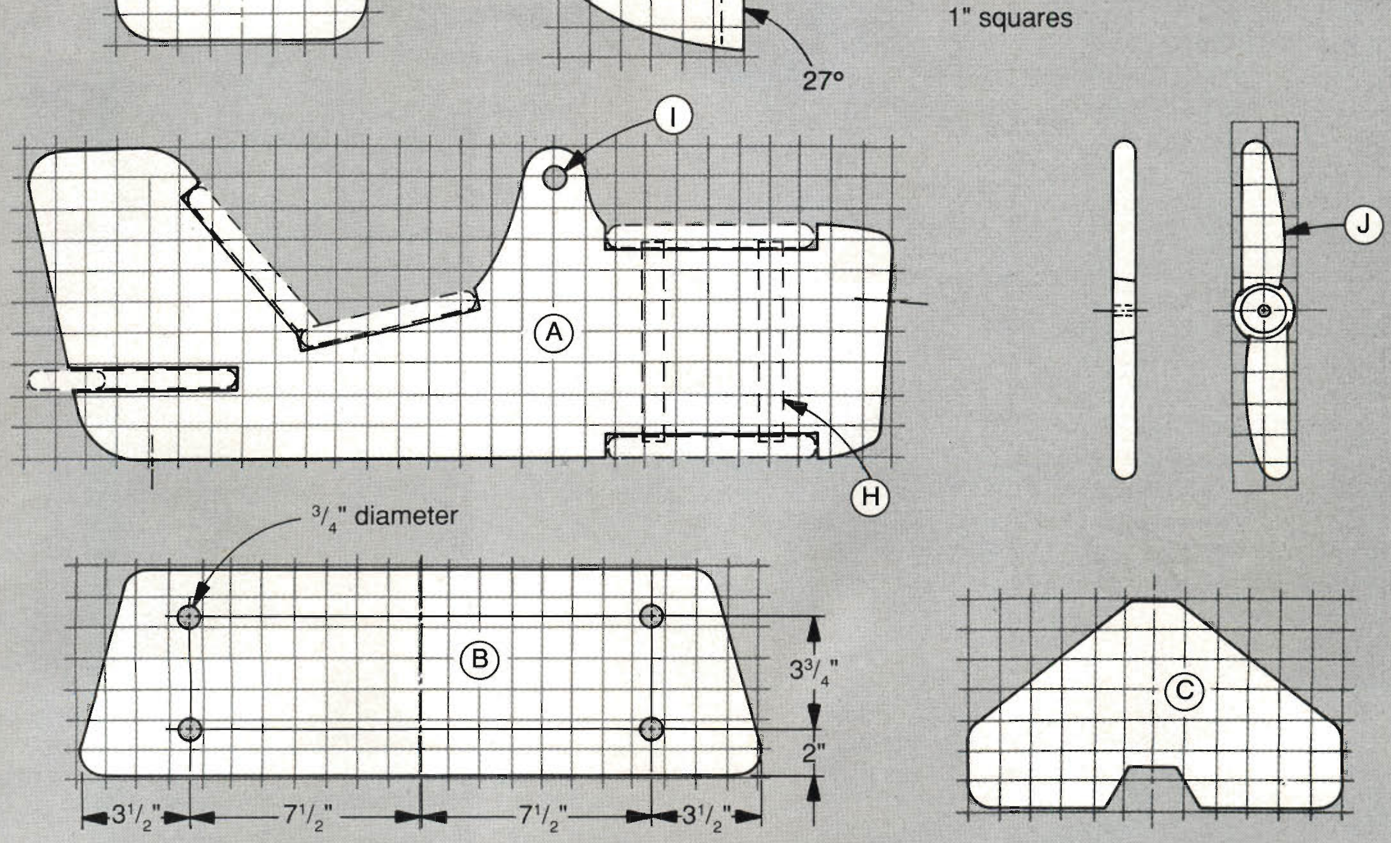
Glue and screw all the parts in place when the paint is dry. Paint over the plugs by spraying a contrasting color on a scrap of plastic, and then dabbing it on with a small brush. The final lettering and striping were done with a 1/4" pin striper. Then I sprayed on two coats of clear lacquer.

Make the propeller (J) from a piece of hardwood and shape it with a rasp and a sander. Stain and lacquer it and then attach it to the fuselage with a 1/4" × 3" long lag bolt with washers on either side of the propeller.

Now put your toddler in the pilot's seat; shout "Contact!" and give the propeller a spin. Then get out of the way because new pilots fly pretty low. **PW**







Tom Larson

Inlaid Dice

by D. A. Stansbury

Add a little touch of Las Vegas to your desk or coffee table with a nicely-matched set of wooden dice. They can be made just about any size you choose from about 1" on up. Of course, the larger they are, the easier they are to work with.

The size I'll be discussing here will be a set of 3" dice, made of solid black walnut and inlaid with white birch. Choose a nice, select chunk of walnut (or other hardwood) with little grain variation (no knots or wavy grain) enabling you to maintain a good, solid appearance. Just remember – the dice and dots must contrast. If you can't get your hands on material that is over 3" thick, glue up stock taking care to match the color and grain.

Cut the wood down until you have two 3"+ cubes; leave enough stock for sanding and squaring. With the aid of a belt or disc sander and a caliper made up of the metal rule from one and the stocks from two combination squares (see the sidebar on the next page), sand the cubes until they are perfectly squared. Set the caliper at 3-1/32", and be careful not to oversand. Use the caliper to check your cube from all sides and work it until it fits snugly in all positions.

Once you have both dice perfectly squared, you are ready to lay out the dot locations. Dice are traditionally marked so that the dots on opposing faces add up to seven. The one should be opposite the six, two opposite the five, and so on. Getting perfect positioning for the dots is not as difficult as you might think when you take advantage of the combination square. Once you visualize the actual layout (see Figure 1) it will be easy to mark off each die. After you've located the centers of the dots, I suggest using an awl or center punch to mark the hole to be drilled because you don't want the drill to drift. If you have a drill press and a machinist's vise to hold your work, you shouldn't have any problem. Without proper holding, it's been my experience to have the dots drift out of alignment.

After you have the six sides of the cubes properly laid out and punched, you are ready for drilling. The correct size drill for the 3" cube is 5/8" in order to accommodate 5/8" doweling. Set the drill press depth to 5/8". Be sure your drill is

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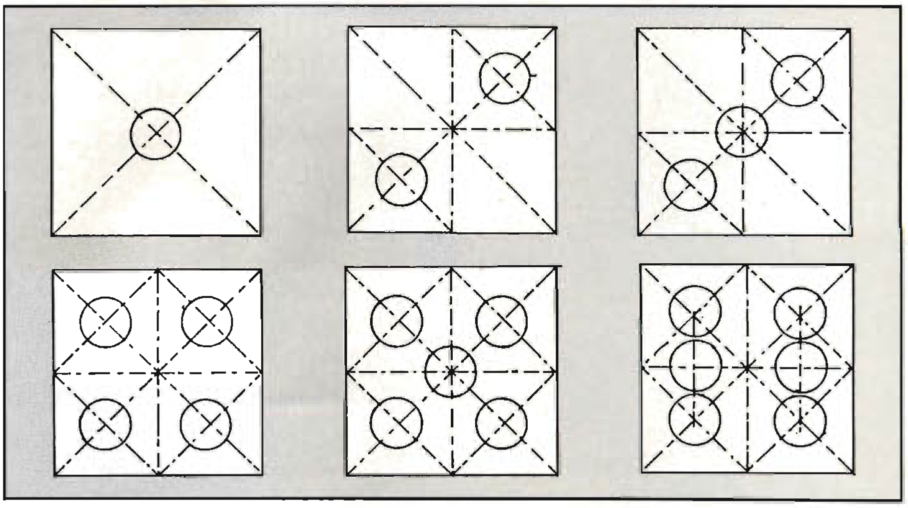
D. A. Stansbury *is a woodworker in Paradise, California.*

sharp so it won't break out the spaces between holes. The number six has very narrow spaces and should be located on an end grain surface for best results.

After completing the drilling operation, you are ready to prepare the dowels to be used for the dots. Choose a clean piece of 5/8" white birch doweling and cut 42 pieces that are 5/8" long (21 for each die). If you are interested in matching grain-flow, use a plug-cutter and cut some side grain plugs where desired.

You may not need any adhesive when setting the "dots" if you have a good tight fit. I usually use a small dab of brown urea-type water-base glue that I mix rather thin. Carefully drive the dots into the holes. If the hole was drilled to the right depth, the dot should end up flush with the surface of the cube, making for less final sanding. After you have all the dots driven home, do some finish sanding and your set of dice is complete except for whatever finish you desire. You might only want to oil them with linseed oil or perhaps you might prefer a sealer/varnish such as I use. That decision is up to you.

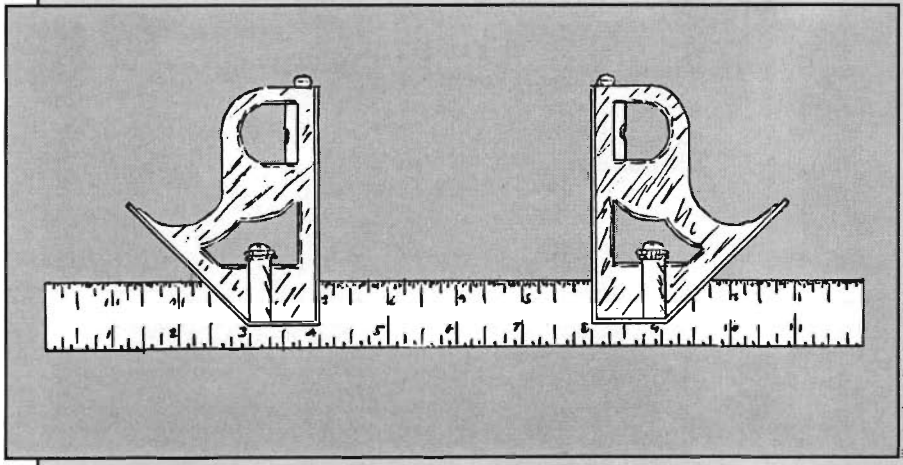
These dice are attractive decorations and make excellent conversation pieces; but who knows? Maybe you and your friends might want to have a "Las Vegas Lawn Party" and use your new set of dice to play lawn craps! Good Luck!



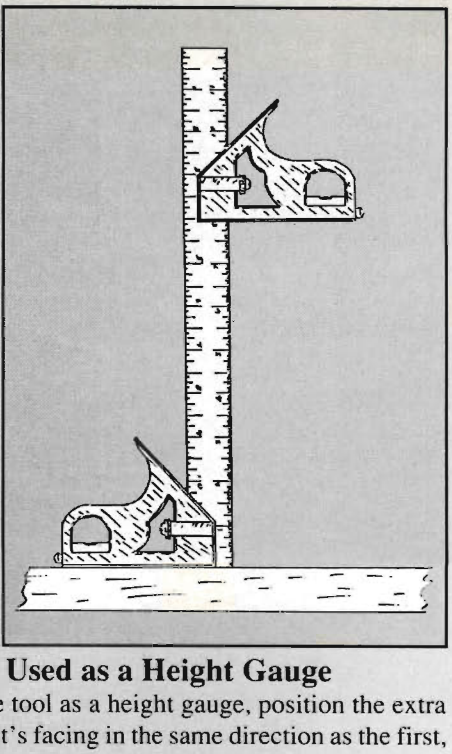
Combining Combination Squares

by D. A. Stansbury

You know how useful a combination square can be. Well, I've discovered a couple more helpful functions by sliding the stock of one combination square onto the blade of another.



illustrations by the author



Used as a Caliper

Position the second stock on the blade so the 90° angle faces the 90° angle of the other stock and you'll have an effective outside caliper for checking squareness, parallelism, thickness, and width. Installing the heads in the opposite direction (faces outward) will allow you to use the tool as inside calipers for very large objects.

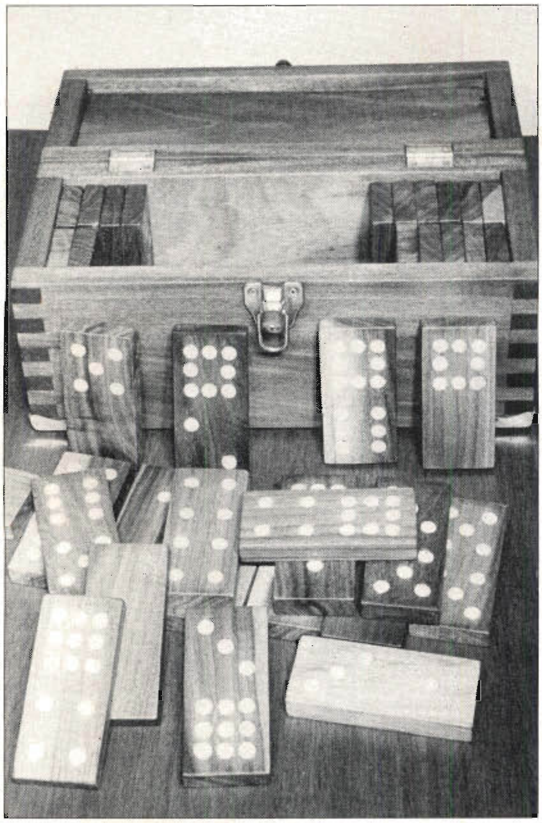
I used a makeshift outside caliper arrangement of this sort as an aid in sanding 3" cubes to perfect squareness for the dice project above.

Used as a Height Gauge

To use the tool as a height gauge, position the extra stock so that it's facing in the same direction as the first, but on the opposite edge. Place both the gauge and the part being measured onto a flat surface in order to obtain an accurate measurement. There will be many different uses for this makeshift height gauge: checking overall heights, checking flatness to a common surface, and comparing like pieces to each other.

Gift Project

Build a Box of Dominoes



photos by author

by Hugh Foster

Here is a project that makes a handsome gift, a treasure to keep, or a fine saleable item. It is a box of large dominoes, the kind that you can use with your glasses off.

To make the box, cut the sides (A) and ends (B) to size according to the cutting list. This dimension is correct if you plan to join the box sides together with box joints (see page 38), dovetails, or miters. If you rabbet the corners you'll have to change the length of the ends.

The top and bottom (C) are let into a rabbet in the sides and ends (see Figure 1). If you mitered the box, you can cut these 1/4" X 1/2" rabbets on the table saw. With box joints you should dry-assemble the sides and ends and use a router to cut the rabbets.

Assemble the box and, when the glue is dry, cut it open at about 1-1/4" from the top. Clean up the box inside and out and apply the hinges and hardware. Carving small designs in the box adds a nice personal touch; this one, a gift for my father, has both his name and a floral design carved in the top.

***Hugh Foster** is a part-time furniture designer/builder in Manitowoc, Wisconsin.*

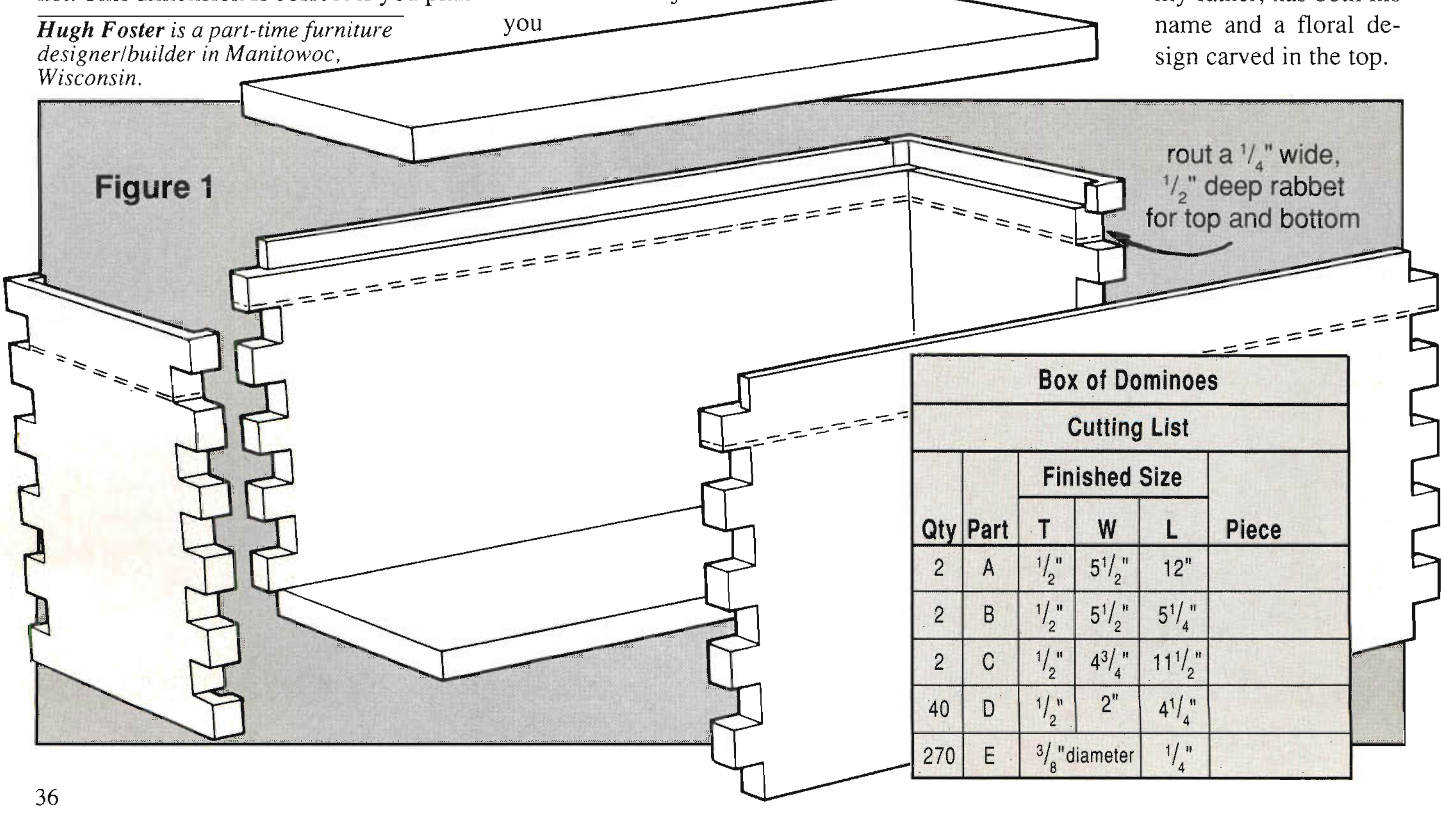


Figure 1

rout a 1/4" wide, 1/2" deep rabbet for top and bottom

Box of Dominoes

Cutting List

Qty	Part	Finished Size T	W	L	Piece
2	A	1/2"	5 1/2"	12"	
2	B	1/2"	5 1/2"	5 1/4"	
2	C	1/2"	4 3/4"	11 1/2"	
40	D	1/2"	2"	4 1/4"	
270	E	3/8"diameter		1/4"	

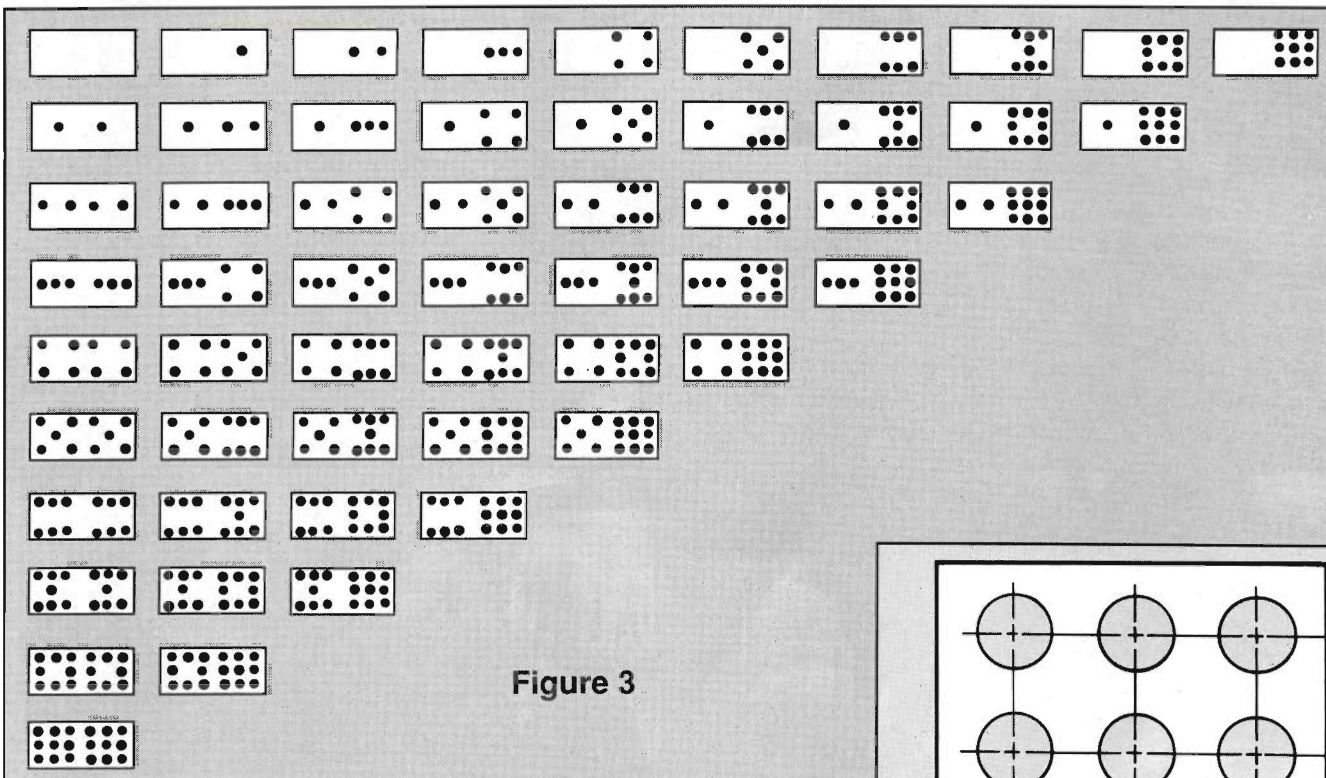


Figure 3

Tom Larson

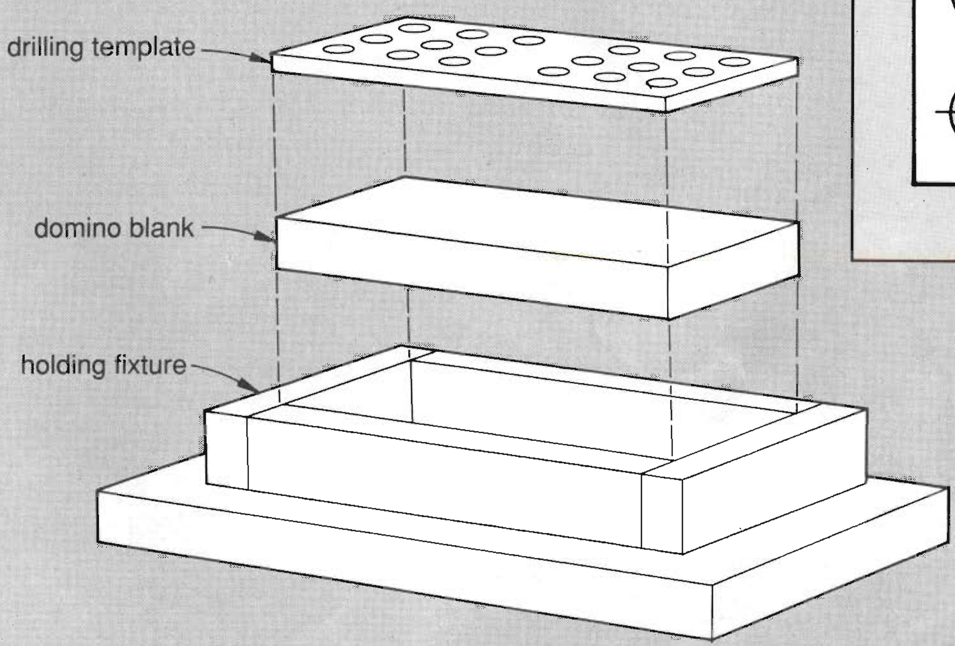
Now on to the dominoes.

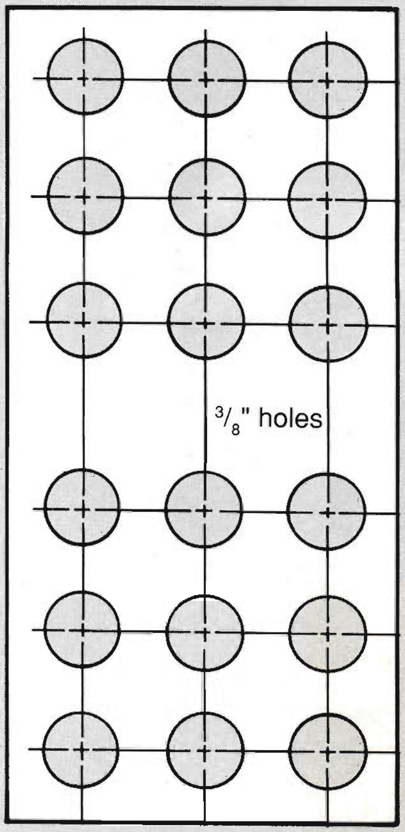
Cut 40 pieces of 1/2" × 4-1/4" of plain-grained wood; I've used walnut because it's nearly black when oiled. After you have cut 40 blanks, make a template that will permit you to drill 9 evenly spaced holes on either end of each domino face. When I drilled my dominoes I fit the blank and the drilling template into a moveable fixture (see Figure 2) , and moved the fixture around on the drill press rather than trying to keep the template lined up on the blank manually.

Use a Forstner bit to drill 3/8" flat-bottomed holes about 1/4" deep into the dominoes. Figure 3 shows the configurations for drilling the dominoes.

After the holes are all drilled, make 270 contrasting plugs from 3/8" dowel stock, or use a plug cutter to cut them from scrap stock and glue these into place. After the glue has dried, sand them flush on a stationary belt sander, and finish–sand them before applying the finish. PW

Figure 2



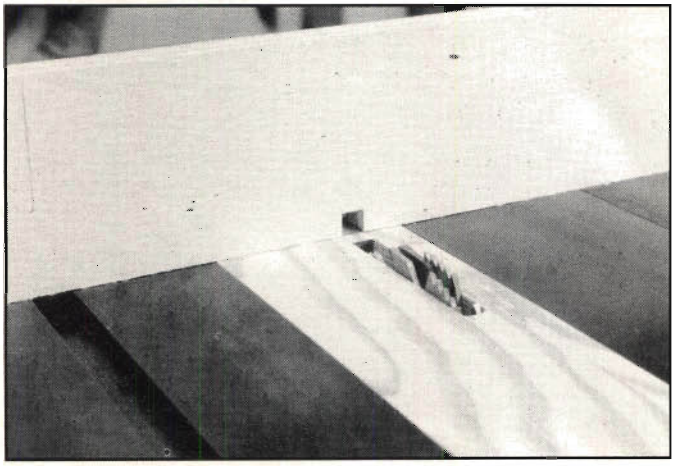


Full–Size Template

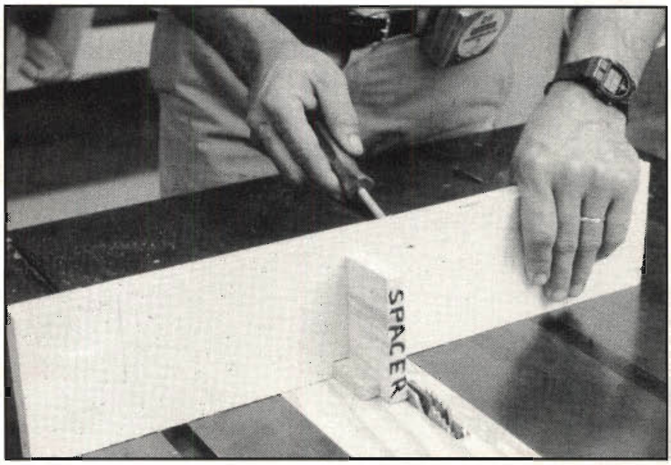
Making Box Joints

by B. William Bigelow

The box joint is an attractive corner joint; the large amount of side grain glue area also makes it one of the strongest. Box joints can be cut on the table saw with a simple wooden indexing jig and a dado set. The jig is designed to hold the stock safely and index the cuts so the fingers of the joint slip nicely together. The process I demonstrate here will cut and space the fingers of the joint at the same thickness as the boards to be joined. Stock that is 1/2" thick will have 1/2" square fingers, and 3/4" stock will have fingers that are 3/4" square.



Make a plywood backup board for the miter gauge and cut a notch in it that is as wide as you want the fingers to be.



Photos by Deborah Porter

Insert the indexing pin, and shift the backup board so that a spacer that is the same thickness as the blade and pin fits between them. Then attach the board to the miter gauge.

Screw a flat plywood piece to the miter gauge. This backup board should be wide enough so that you can clamp the stock securely above the dado blade, and long enough to support the stock for its entire width—plus a couple of inches. Next check the table saw setup. A few checks at this point will eliminate the "what went wrong?" head–scratching later.

Check that:

✓ The blade is parallel to the miter gauge slots.

✓ The blade is set 90° to the table.

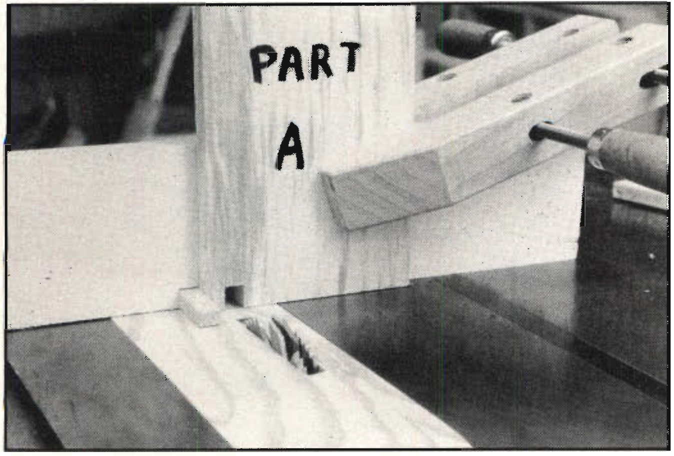
✓ The miter gauge and plywood board are set 90° to the blade, and also 90° to the table.

Set the width of the dado blade equal to the thickness of the stock. I would recommend using a plywood table insert that fits close to the blade.

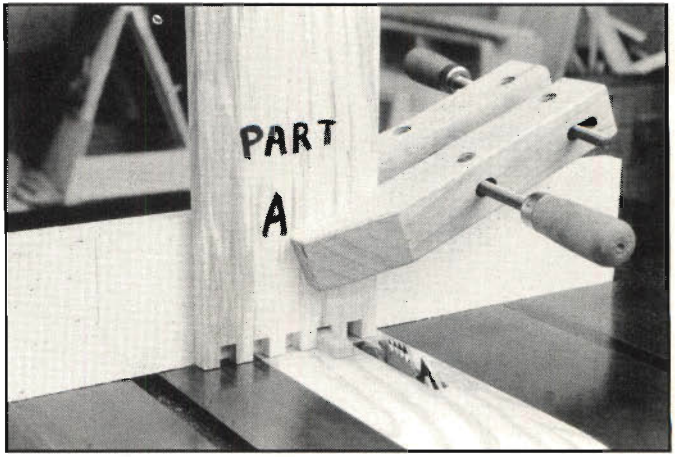
To make the slot for the indexing pin, adjust the blade height to be slightly lower than the stock thickness. Making the pin a little shorter than the full cuts will insure good chip clearance when you cut the box joint. Cut through the backup board. Make and insert an index pin that is the same thickness as the width of the blade.

Unscrew and shift the backup board to one side of the blade as shown. Gauge the new location with a spacer block of the

Clamp the box side (part A) to the board with the edge against the indexing pin to make the first cut.



Make the rest of the cuts in part A by referencing each previous cut on the indexing pin.



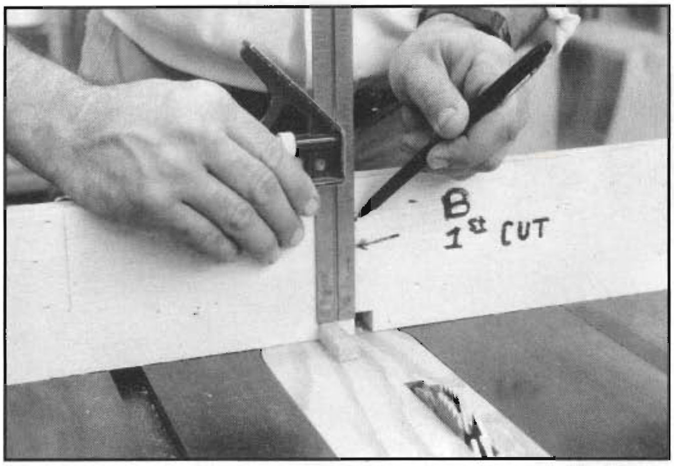
***B. William Bigelow** is a high school woodshop teacher in Surry, New Hampshire.*

on the Table Saw

stock you are using, and then secure the plywood to the miter gauge with screws. If necessary, put shims between the board and the miter gauge to make the board square to the table. The width of the blade, the width of the index pin, and the space between the two should all be the same.

Raise the blade to just slightly higher than the stock width. This will run the box joint fingers slightly proud of the finished joint; you can sand them flush later.

Clamp the box end (part A) against the index pin as shown.

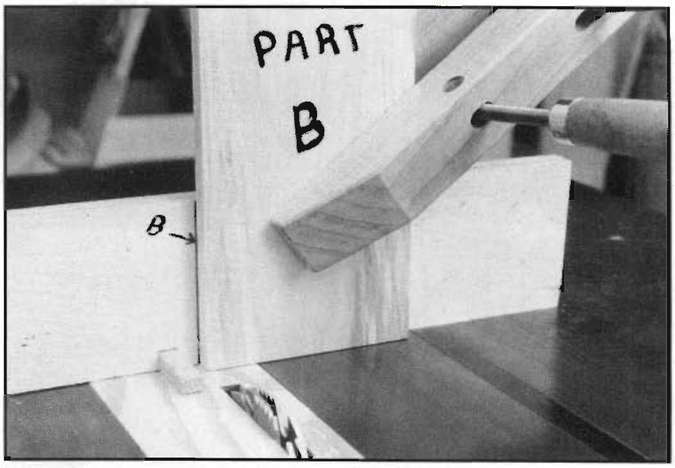


Make a mark on the backup board that lines up with the edge of the notch.

Clamping the stock to the plywood will provide a safer and cleaner cut than you'll get by holding it just by hand. Make the first cut then continue cutting across part A, placing each previous cut on the index pin. Keep the table saw surface clean so the stock does not ride up on sawdust.

Cut the joints on the B parts after you have cut both A's. Make a mark on the jig to line up the top edge of part B with the edge of the blade. Clamp part B against the mark for the first cut, then follow the same procedure you used for cutting the A's.

Once you understand the process, you can make any joint size you like, so long as the width of the dado blade, spacer, and index pin remain proportionally the same. I used 1/2"–thick stock here, and the finished box joint fingers were 1/2" square. Thicker stock could be used with this same setup, but you'd need to adjust the blade height to accommodate the thickness. Since the stock was 5-1/2" wide, the box joints came out even, and part A begins and ends with a finger. If the dado blade, space, and index pin are all set in some even multiple of the width of the stock, then the fingers will be even.

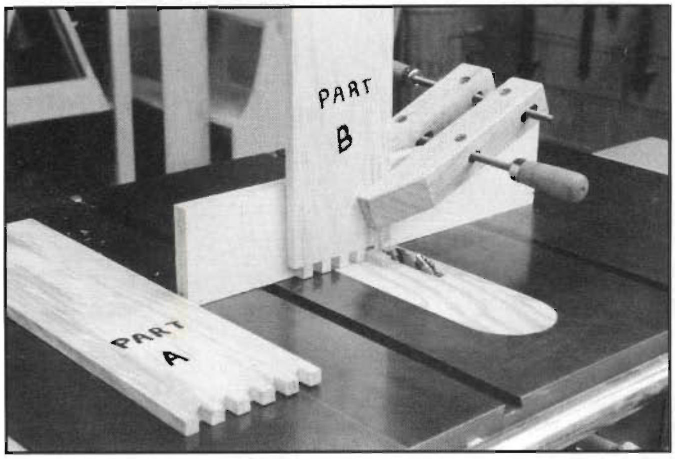


Clamp the box end (part B) against the mark to make the first cut.

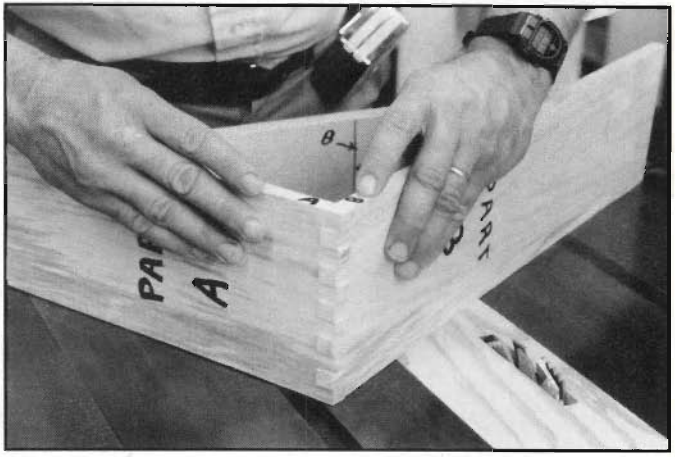
I often use box joints in drawer construction, and have multiple A and B parts. I like to clearly mark the outside and top of each part to avoid mismatching parts around the drawer.

On your first box or drawer, a little experimentation is in order before cutting all the parts. A little time with scrap stock is worth a thousand words. **PW**

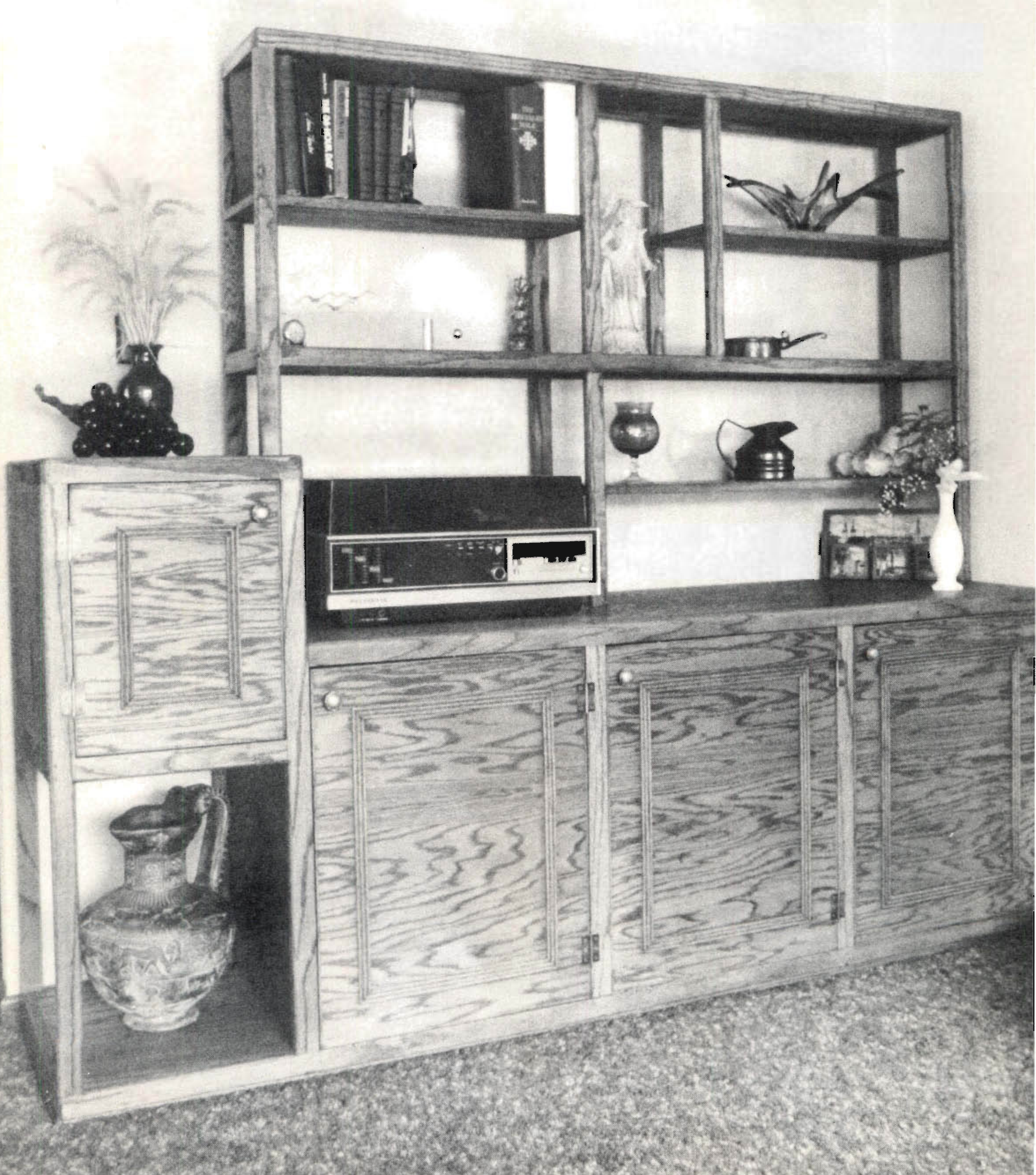
Move part B along the indexing pin for each subsequent cut.



The fingers are cut slightly proud so they can be sanded flush after assembly.



A Storage and Display Cabinet



by Paul Gerhards

This multi-purpose storage unit is as versatile as it is attractive. The frames are made of 3/4" nominal oak stock, and 3/4" oak plywood is used for the shelves, doors, and end panels. The cabinet is built in two separate units that can easily be disassembled for moving.

When selecting materials, be certain that boards are straight and dry. This is especially important because some of the end grain on the rails is intentionally exposed and on the same plane as much of the edge grain. Too much drying after assembly will result in surfaces that are uneven and in need of replaning.

When selecting plywood, look for sheets that have attractive grain patterns, and are as free as possible of voids beneath the face plies. Voids can be discovered by lightly rubbing the sheet with your hand and listening for a change in sound. A slightly hollow sound indicates a void. Three sheets are needed.

Making the Base

Begin the base by ripping solid stock to width slightly over 1-1/2" for the face frames. Remove the saw marks with a jointer or plane. Assemble the front and rear frames first by cutting the rails (A, B, C, D, E, and F) and stiles (G and H). In face–frame construction butt joints are used throughout, so be sure the ends are square and clean.

Lay out the parts for the front face frame on a large worktable or your shop floor. Figure 1 shows where to locate the stiles in relation to the rails. Traditional face–frame construction calls for doweling the frame together. I chose to put glue on the ends of the stiles, clamp them between the rails and then drill, countersink, and drive a single 2-1/4", #8 flathead wood screw into each joint. I went back and plugged the holes later.

Before assembling the back frame, lay out and cut the 3/8" deep × 1/2" wide rabbets for the backs (I and J) as shown in the detail of Figure 1. (Note: this is only necessary if you do the rabbeting on a table or radial arm saw. Another option is to do it with a router, after assembly.) Be sure the frames are square, but do not install the backs yet.

Next, rip the plywood panels for the backs (I and J), bottom (K), partition (L), ends (M and N), tops (O and P), and shelves (Q and R). Figure 2 shows the best way to cut the parts from the plywood. To assure accuracy, cut them to length only as each piece is needed. Before cutting, pick the best–looking sheet for the doors (S and T) and rip about 26" from this piece; set it aside.

Glue and dowel the two end rails (F) to the left end panel (M), and one each to the top of the right end panel (N) and the top of the partition (L).

Cut the base ends (U) and the toe board (V) to size. Notch the front edge of the base ends, as shown in Figure 2, creating a right and a left piece. Notch the toe board as shown, then glue and nail this assembly with 6d finishing nails (drill pilot holes to prevent splitting).

Cut the bottom (K) to length and make a 3/4" wide × 3/8" deep dado at 14-1/2" from the left end for the partition (L). Apply glue to the ends of the bottom and the top of the toe board, then fit the bottom between the base ends, clamp it, then nail. Glue and clamp the front and back frames to the bottom shelf assembly using 6d finishing nails where necessary. When nailing, be sure to space the nails evenly;

***Paul Gerhards** is a woodworker and freelance writer in Portland, Oregon.*

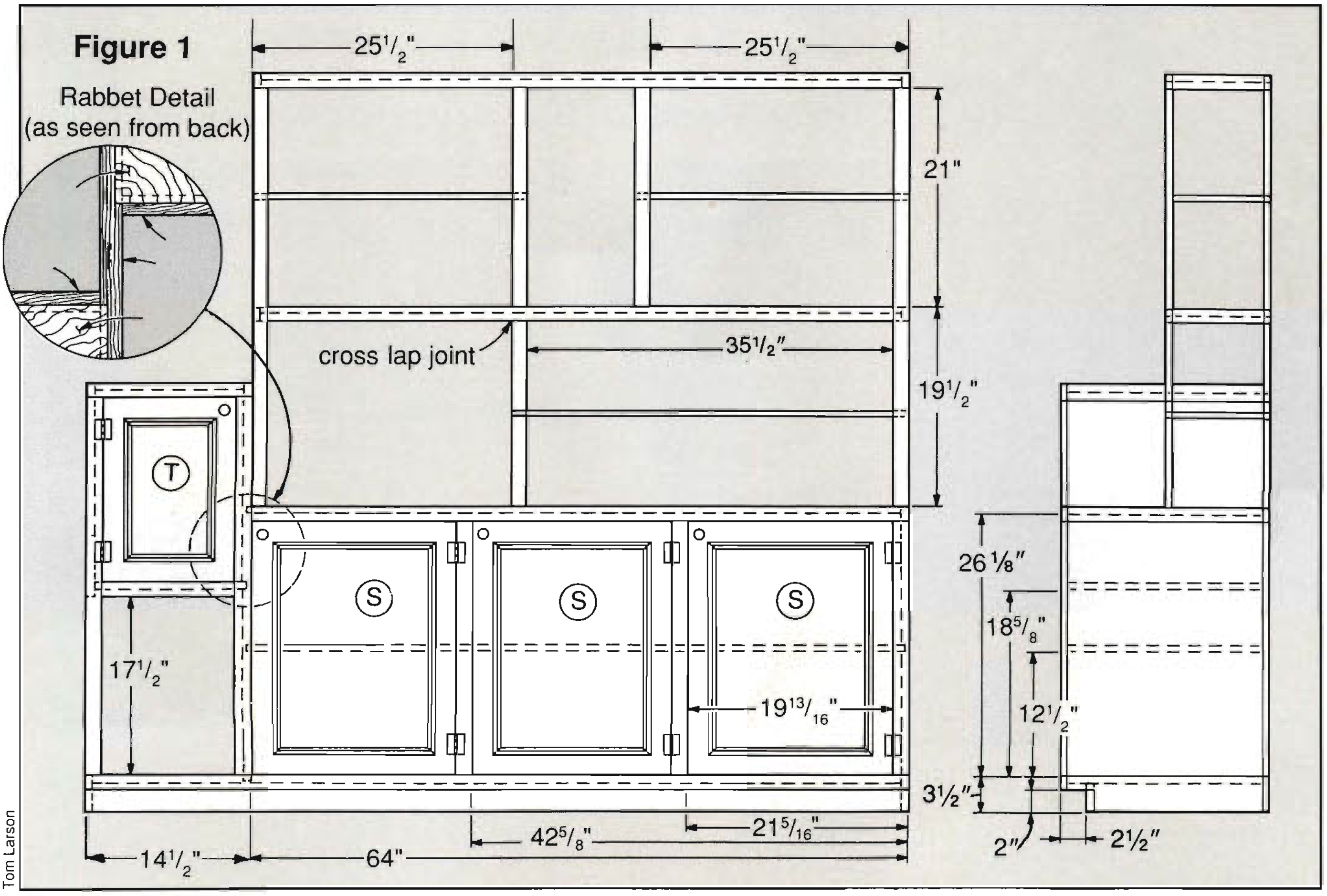


Figure 1

Tom Larson

even though the holes will be filled, they will be less noticeable if evenly spaced. When joining plywood panels to the frames, be sure the adjoining surfaces are flush.

On the right–hand surface of the partition, cut one 3/4" wide X 3/8" deep dado at 12-1/2" from the bottom and another at 26-1/8". These are for the large shelf (Q) and the large top (O) to fit into. On the left–hand surface, cut the same size dado at 18-5/8" from the bottom for the small shelf (R). Apply glue to the front and back edges of the partition, clamp it in the groove in the bottom, and secure it with nails through the face frames and the bottom dado.

Storage & Display Cabinet: Base

Cutting List

Qty	Part	Finished Size			Piece
		T	W	L	
1	A	3/4"	1 1/2"	80"	bottom rail
2	B	3/4"	1 1/2"	64"	middle rails
2	C	3/4"	1 1/2"	16"	top rails
2	D	3/4"	1 1/2"	13"	shelf rails
1	E	3/4"	3 1/2"	80"	back bottom rail
4	F	3/4"	1 1/2"	18 1/2"	end rails
4	G	3/4"	1 1/2"	37"	long stiles
4	H	3/4"	1 1/2"	25"	short stiles
1	I	1/4"	26"	63 1/2"	large back
1	J	1/4"	19"	14"	small back
1	K	3/4"	18 1/2"	78 1/2"	bottom
1	L	3/4"	18 1/2"	37 3/8"	partition
1	M	3/4"	18 1/2"	18"	left end
1	N	3/4"	18 1/2"	25"	right end
1	O	3/4"	18 1/2"	63 5/8"	large top
1	P	3/4"	18 1/2"	14 1/2"	small top
1	Q	3/4"	*18 7/8"	64"	large shelf
1	R	3/4"	18 1/2"	14 7/8"	small shelf
3	S	3/4"	*19 11/16"	*24 7/8"	large doors
1	T	3/4"	*17 7/8"	*12 7/8"	small door
2	U	3/4"	3 1/2"	18 1/2"	base ends
1	V	3/4"	2 3/4"	80"	toe board
2	W	3/4"	3/4"	1 1/2"	shelf supports

*dimension includes edge–facing material

Cut a dado at 12-1/8" from the bottom of the right end (N), but don't glue and nail it in place yet. Also cut two chamfered shelf support blocks (W) and glue them to the inside of the two center stiles (H) so their top edge is at 12-1/8".

Now cut the large shelf (Q) to size. It's wider than the other panels to allow for the offset between the back frame and the back panel, so you'll need to cut a 3/8" X 3/4" notch in the back right–hand corner. (Note that the width given in the cutting list *includes* any facing material you might put on the front edge of this piece, so apply the facing before you rip it to width.) Put glue in the bottom groove of the partition and on the tops of the support blocks, then fit the shelf into position. Fit the right end piece (N) onto the shelf and glue and nail it between the face frames. Then glue the large top (O) into the groove in the partition and down into place between the face frames and the end panel.

Put together the right end of the carcase by gluing and nailing the small shelf (R) into its dado in the partition and the small top (P) between the partition and the left end panel (M).

Install the backs (I and J) with glue and 1/2" brads.

Cut the doors (S) from your selected plywood, taking into account the thickness of the edge facing when measuring.

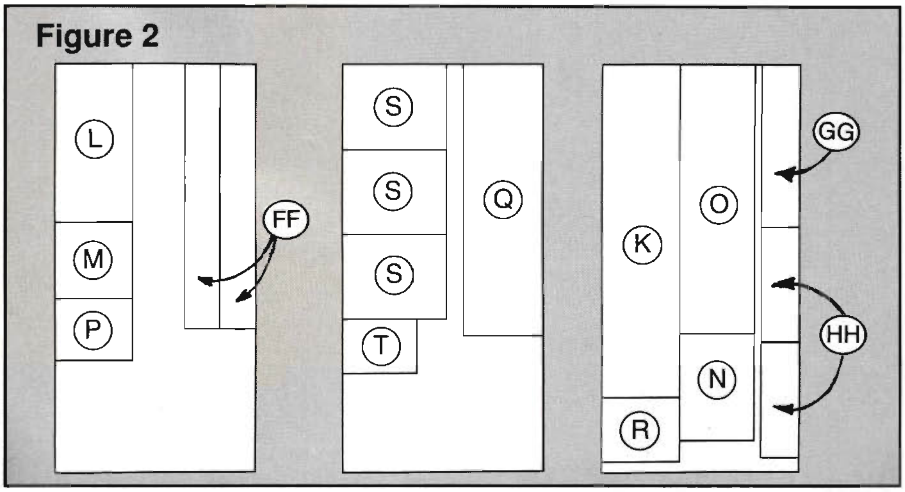
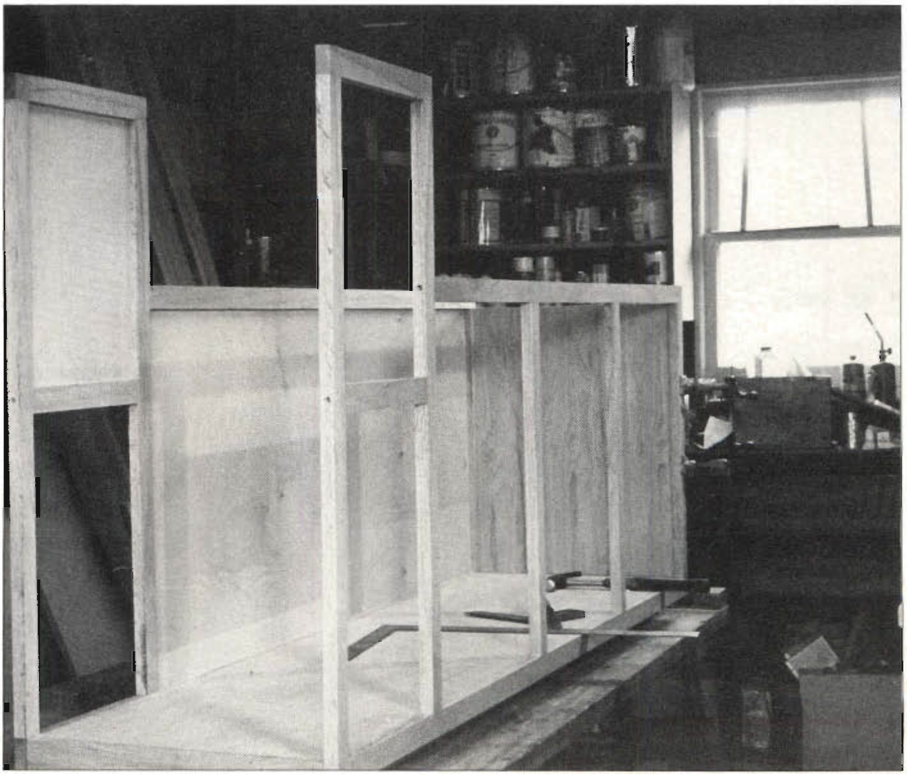


Figure 2


photos by the author

Storage & Display Cabinet: Top					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	AA	3/4"	1 1/2"	64"	top rails
2	BB	3/4"	1 1/2"	61"	middle rails
4	CC	3/4"	1 1/2"	8 1/2"	end rails
6	DD	3/4"	1 1/2"	40 1/2"	long stiles
2	EE	3/4"	1 1/2"	21"	short stiles
2	FF	3/4"	8 1/2"	62 1/2"	main shelves
1	GG	3/4"	*9 1/4"	*38 1/2"	bottom shelf
2	HH	3/4"	*9 1/4"	*27"	short shelves

*dimension includes edge–facing material

Before cutting the three main doors, check the continuity of the grain; it should be horizontal. This adds to the attractiveness of the piece. The moulding on the doors is a standard 3-bead, milled from 3/4" stock.

Making the Top

Assemble the front and rear frames in the same manner as the base. All are screwed (or doweled) butt joints, with the exception of the half-lap joints at the intersections of the middle rails (BB) and the center stiles (DD). Glue and nail the end rails (CC) to each end of the main shelves (FF). Beginning with the lower main shelf, glue and nail it between the frames, and then do the same with the top shelf.

The other shelves (GG and HH) require edge facing on all four edges. Also, note they are notched around rear stiles. They are suspended in the frame with a single 1-1/2" × 8" flat head wood screw, countersunk and plugged, through the stile at each corner. Another option would be to drill a series of holes on the inside surfaces of the stiles for adjustable shelf supports.

Mount the top to the base using 2-1/4" × 8" screws driven up through the top of the base and into the stiles. Round all the outside edges with a router, and sand the unit thoroughly. Attach the doors and hardware, and finish the project with the method of your choice. PW

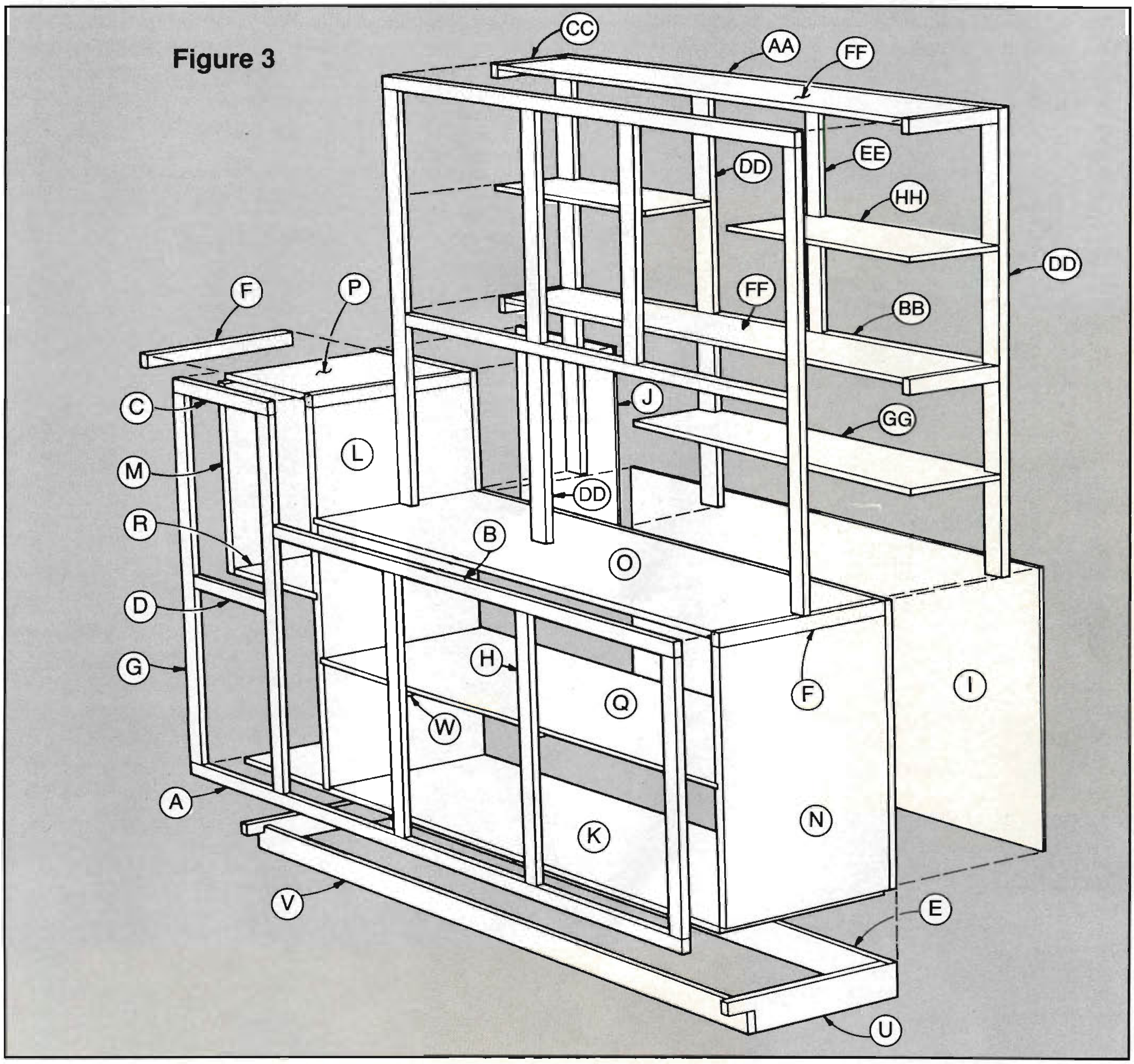


Figure 3

Tom Larson

Project for the Shop

Make Your Own Horizontal Boring Machine

by Jim Meyers

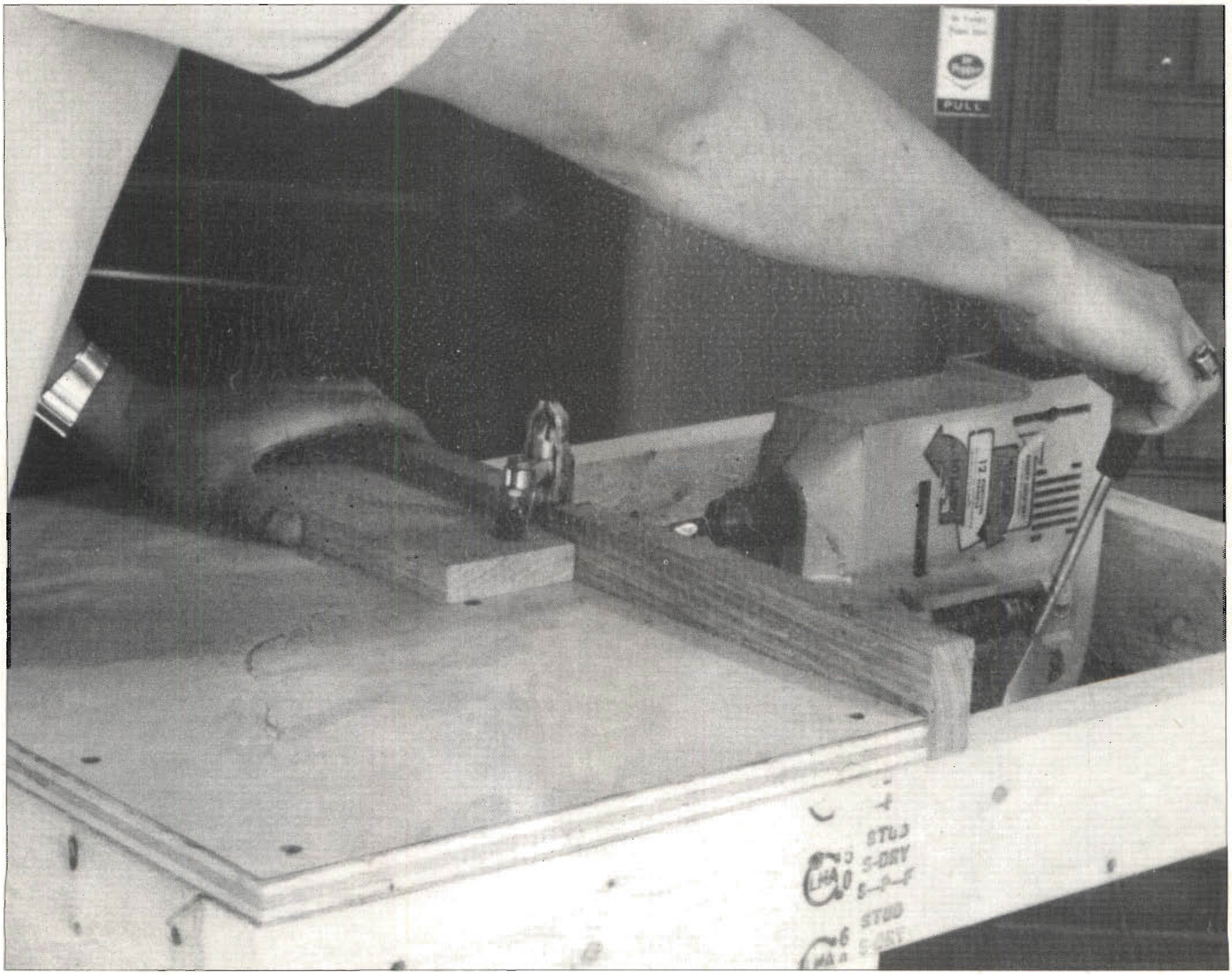
A horizontal boring machine is a luxury in most shops; but if you do much face frame construction or other doweled joints, it's practically a necessity. I had made do with a doweling jig for years and couldn't really justify spending the money on even a used boring machine. But when I got an order for 12 oak toilet seats, the idea of drilling 196 holes with a doweling jig didn't excite me. I decided to build a machine of my own.

***Jim Meyers** does all kinds of woodworking from building kitchen cabinets to musical instrument repair in Bellingham, Washington.*

Since a horizontal boring machine is basically a drill press on its back, that was the path I followed to design my machine. I picked up a used McGraw-Edison benchtop drill press for $40, a toggle clamp for $8, and used about $10 worth of lumber, glue, and screws.

The dimensions in the drawings are given just as a starting point. Since you won't necessarily use the same drill press or have the same size requirements, you'll need to alter the dimensions to suit your needs. I don't dowel very long pieces and my shop space is limited, so I tried to make it as small as possible. The work table is 20" wide and 13-1/2" deep. When building my workbenches, I've found the rule of belt height to be most comfortable, so my table height is 38".

After I decided on the table size, I measured the maximum distance from the bottom of the drill press base to the tip of the drill bit. The motor was positioned 2" from the top of the shaft as I took this measurement so that I'd have that top portion of the shaft to mount to the back of the frame. This measurement enabled me to determine where to locate the mounting boards so the bit would be just behind the backstop when retracted. That gives it the



shortest travel distance. It also means that I have to swing the motor to one side to change bits; but since most of my holes are for 3/8" dowels, it is a very minor inconvenience.

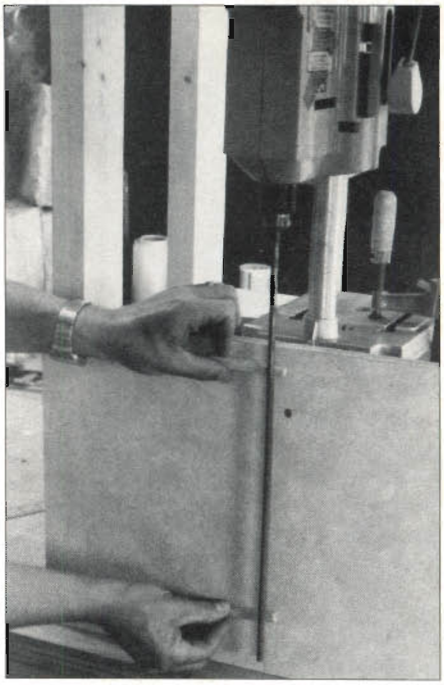
The other measurements you need to check on the drill press are the distance from the drill bit to the motor mount shaft and the size of the baseplate. Once these dimensions are known, you can get the total depth needed for the frame and determine where to place the mounting boards.

I made the frame from standard 2 × 4's and the mounting boards from 2 × 6's. The tabletop is 3/4" plywood and the backstop is a solid hardwood. Cut the pieces to size and then glue and screw them together (excluding the backstop).

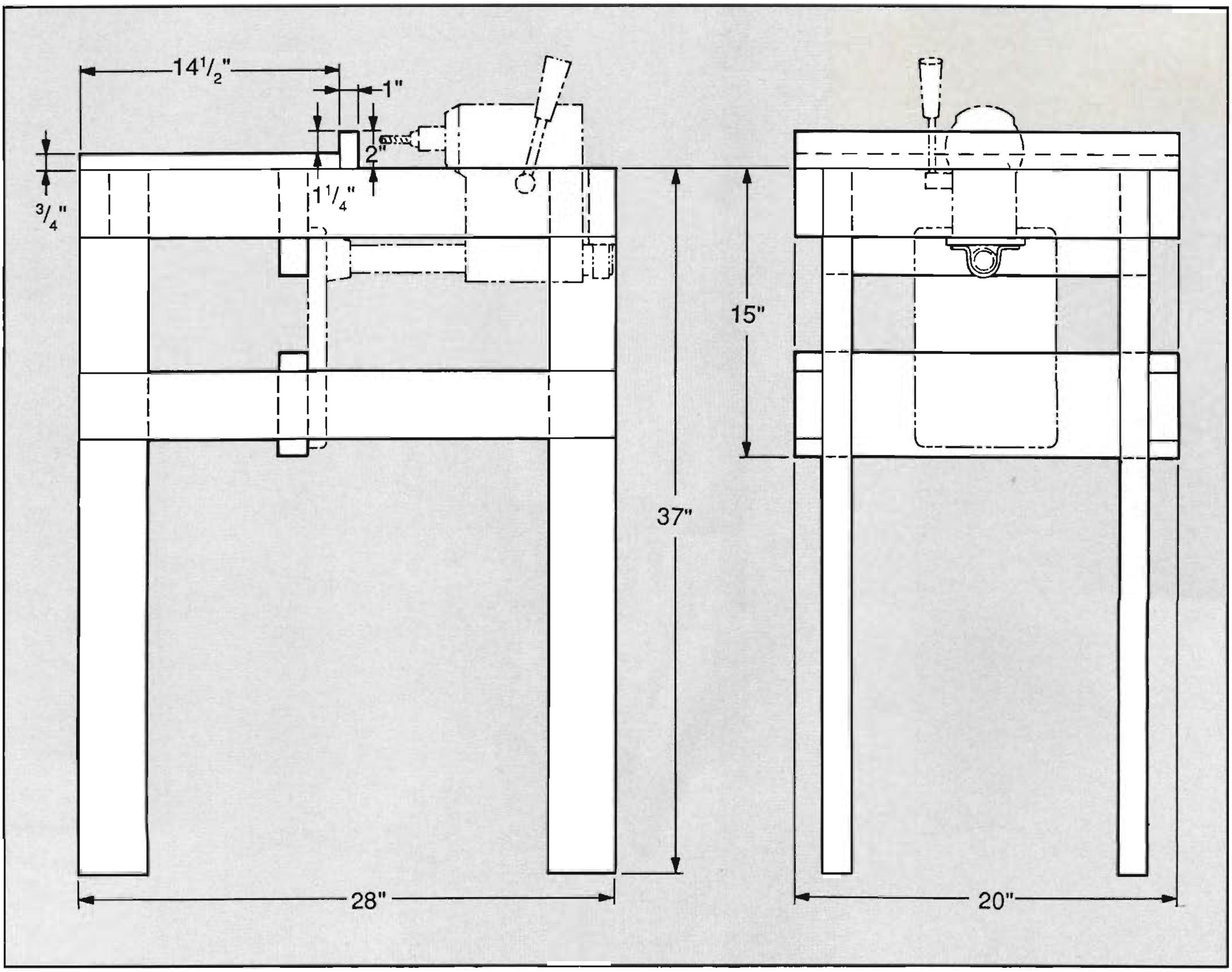
The most difficult part of this project is installing the drill press so it will drill parallel to the table and perpendicular to the backstop. The best way I found to do this was to use a straight piece of 3/8" rod or a drill bit that is about 14" long inserted in the chuck. Align a framing square to the back edge of the tabletop, and draw a centerline on the table from front to back at the point where the drill bit would be. Lay the assembly face down on your workbench, set the drill stand in its approximate position, and clamp it down. Chuck up the long rod and see if it's centered on your line. If it's not, place a shim under the stand to make it right.

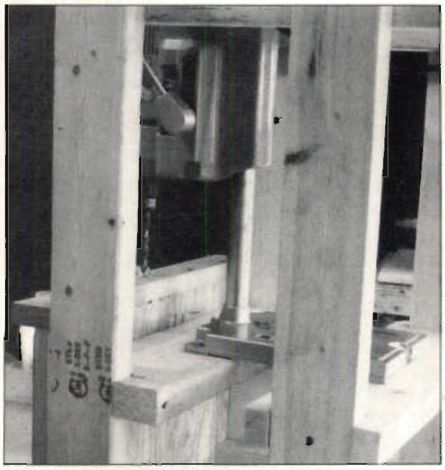
Next, check to see if the rod is parallel to the table by slipping a 3/16" thick piece of wood between the rod and the table at both ends of the rod. Shift the drill press base and shim under it as necessary to make the table and rod parallel. When making these adjustments, check to make sure the rod stays on the centerline. Keep the clamps on after aligning, and mark and drill through the mounting holes in the baseplate for 1/4" bolts, washers, and nuts.

Mount the top of the drill press shaft to the underside of the 2 × 4 at the back of



Check that the machine drills parallel to the tabletop by placing 3/16" blocks under the two ends of the rod.





Shim under the drill press stand as necessary, then bolt it to the frame.

the frame. You'll need a shim that is 1-1/2" wide and about 4" long and thick enough to fill the space between the shaft and the 2 × 4. Put the shim in place and fasten the shaft with a pipe hanger or plumber's tape.

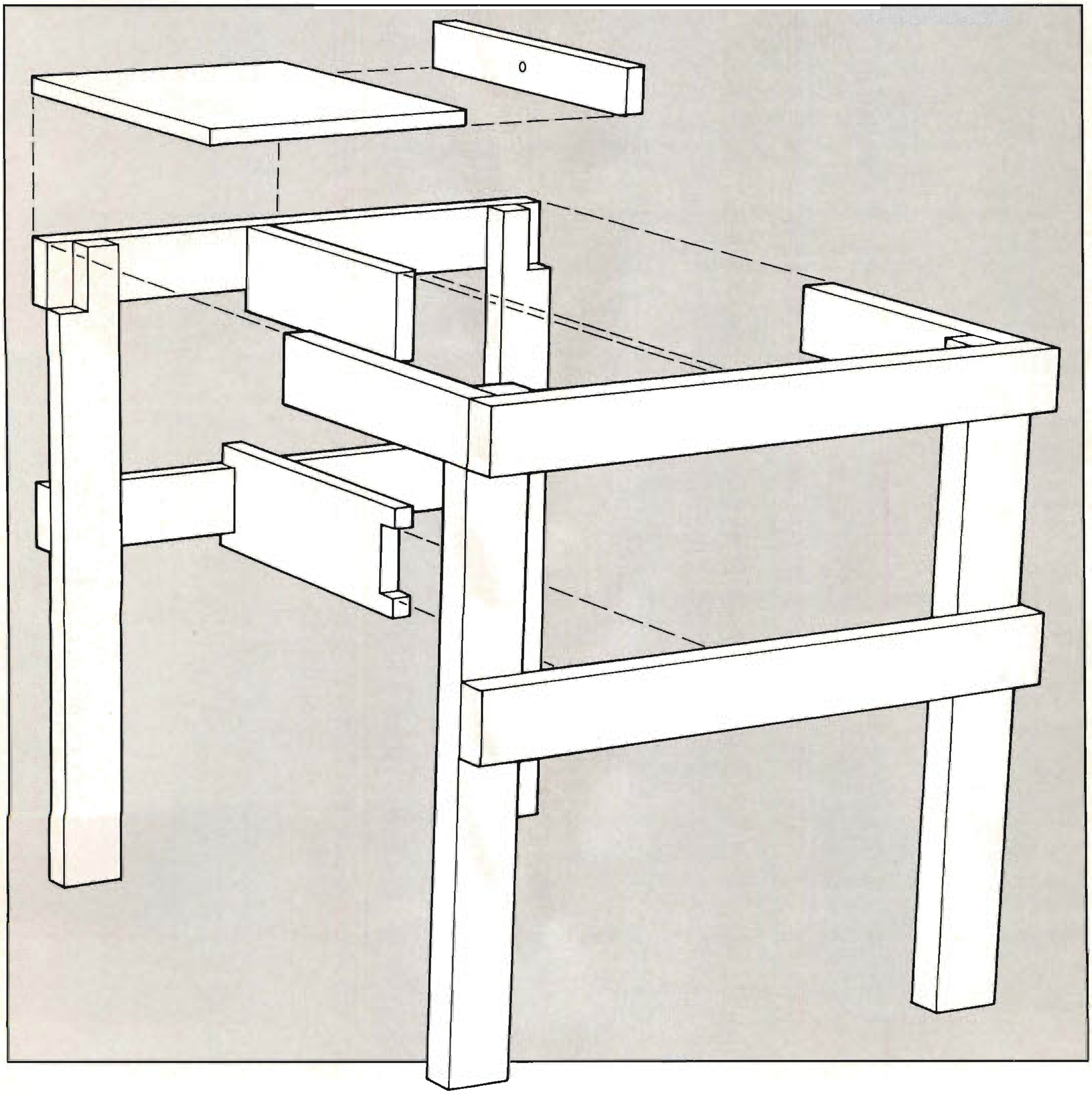
When the bolts have all been tightened, check again to make sure everything is still in alignment. Remove the rod and install the bit you will use. Install the backboard with four 2-1/2" screws, but don't glue it. Plug in the machine and bore through the backboard.

Now set the stand upright on the floor, and draw a line on the face and top edge of the backboard and centered over the hole for referencing your work.

To mount the toggle clamp, remove the backstop and cut a 1/2" deep × 1-5/8" wide dado located 5/16" to the left of the reference mark. By making the dado wider than the clamp, you can mount it at an angle so it clamps down over the hole you are drilling. You can only use three of the four screw holes in the clamp, but that's sufficient.

The last detail is to give the stand a coat or two of paint.

As for my toilet seats, after marking the pieces, I drilled all 196 holes in 1 hour and 15 minutes. I think the doweling jig would have taken a bit longer. PW



Pastor Turner

by Bob Ballance

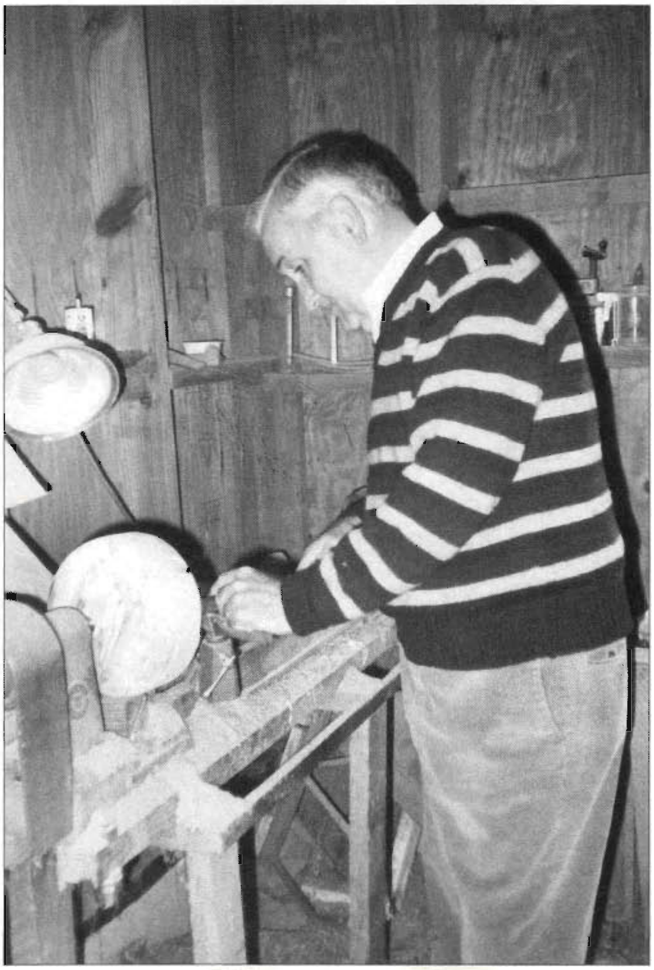
Turning a hobby into cash is a motivating factor for many weekend woodworkers and woodturners. Charles Wellons, like most serious hobbyists, makes a few custom pieces now and then and sells them for a small profit, though most of his woodcrafting is just for pleasure. He's really not interested in the money.

Wellons is a pastor of a small rural church in northeastern North Carolina. As a former member of his church, I had heard him say a number of times that a preacher "has to have a hobby to keep his sanity," so it was a real privilege to visit his small woodshop, his "sanctuary of solitude." He often goes out to his shop to escape from the daily routine of visiting and sermon writing.

A few years ago, he decided to make his woodworking a part of his ministry. "I had always wanted to give something to people in the hospital when I visited them," he said, but he knew it would be too expensive to buy each of his members a gift when he visited.

In the small garage of the parsonage, he had been making woodcrafts. Once he got a lathe and began making bowls, he decided that he could give those to people when visiting. "The first bowls I made were pitiful, but eventually I got better." Now Wellons is known all over northeastern North Carolina for his bowl–making talent.

He decided to limit his bowl–turning ministry by making bowls just for the ladies of his church membership. "There just wasn't any profit in giving the bowls to the men," he said jokingly. He was referring to the fact that once out of the hospital and back home, the women of the church often sent him baked goods in gratitude for his hand–turned bowl. His real reason for excluding the men, however, was to save time and expense. He realized early on that this hobby–ministry could easily become too much for him to handle.



Then he got into trouble with the menfolk of the church for showing partiality. To satisfy the men, he began turning miniature baseball bats. "They're easy to make, and I make 'em just to keep the men quiet," he chuckled.

Wellons started making the bowls over ten years ago and the bats a few years after that. He figures he's made about 500 bowls and bats during that time. So how does a rural pastor hold the costs down?

"Whenever someone in the church cuts down a tree, I usually have a chance to salvage some of the wood from it for my bowls. Sometimes I find old stumps that I dig up and use. And when members of the congregation find unusual pieces of wood, they bring them to me. I take the odd–shaped pieces of wood and work with them until they're a suitable size. So I really don't have to buy the lumber. If it wasn't for that, I wouldn't be able to afford to do it."

A few years ago, he decided his garage had gotten too small to serve as a storage area and workshop, so he built a larger shop in his backyard between some apple trees and his garden. Not only did his hobby grow, so did his congregation. It wasn't long after he moved to his new shop that his congregation voted to build a new sanctuary because it had outgrown the old one.

Since the building was over a hundred years old, he decided to salvage some of the wood from the ceiling beams and floor sills to use in his hobby. Bowls and bats turned from this wood are especially cherished by church members.

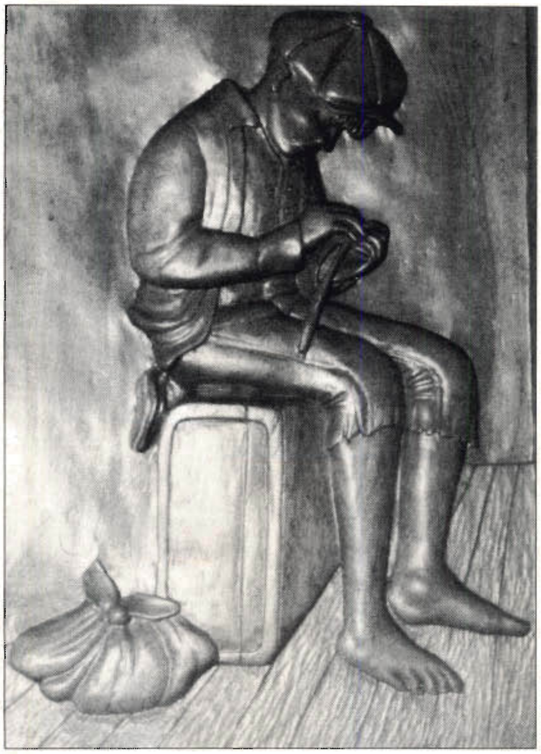
Because the church has grown from 250 members to 500 during his 25 years there, he has more work to do both in the church and in his woodshop than ever. "I really could use some help," he said with a sigh. "There are more people to visit and more bowls and bats to make than ever."

In spite of the hard work and the struggle to find time to spend turning wood, it's obvious from the quality of work and the content of his sermons that Wellons takes pride in doing them both. PW

***Robert Ballance** is a writer from Raleigh, North Carolina.*

Focus on Carving

Relief Carving: The Illusion of Distance



by William H. McMaster

In relief carving the objective is to give an impression of distance and depth much greater than the thickness of wood that is available. In order for the carved scene to convey this enhanced imagery, it must provide the eyes with the same kinds of information that the scene produces when viewed in real life.

There are three methods that the eye and brain, working together, use to give us a sense of distance: **local depth cues**, **visual relationships** and **spatial relationships**. The sculptor must use techniques which correspond to each of these three methods. You cannot rely on just one of them to give a perception of distance, even though the observer of your carving may interpret the scene as being three-dimensional.

Local depth cues are those features that indicate the relative positions of nearby objects and involve such things as **interposition**, **familiar size**, and **positioning** (see Figure 1). Interposition involves the overlapping of objects. Obviously, if one object occludes the view of another, then it must be closer. This can be accomplished by the object either being directly in the line of sight or else casting a shadow. Familiar size is very helpful in determining distance for objects on approximately the same level. As an example, if two objects are known to be the same size and one is rendered smaller in a carving, then it must be farther away. Where an object is positioned in a scene also gives a cue as to its distance. Due to the curvature of the earth, an object that is farther away will appear higher in our view of a scene.

Visual relationships concern the variation of light intensity and the ability of the eye to focus on objects at different distances. The intervening haze in nature causes distant objects to appear darker and not as sharply defined. In a carving, we have a limited ability to create these effects, but through the use of curved surfaces and fewer details the carver can imply distance.

Spatial relationships are satisfied if we reproduce the retinal

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William H. McMaster is Chief of the Education Division of the California Carvers' Guild. His "Focus on Carving" is a regular feature in PW.

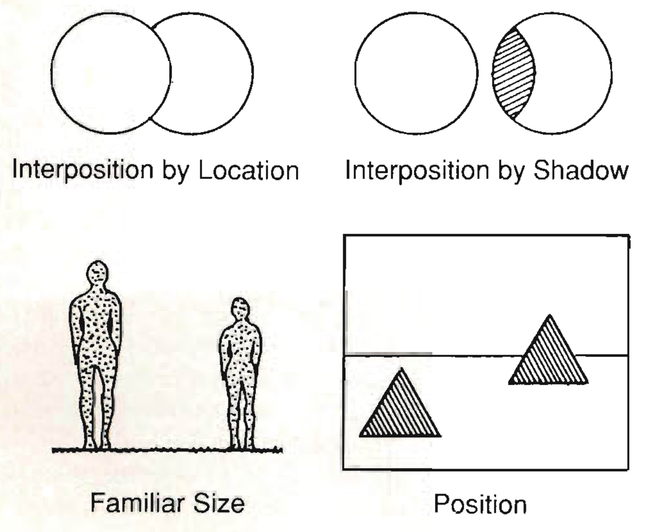


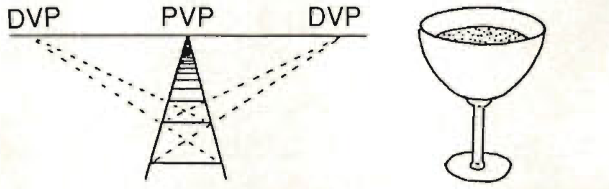
Figure 1. Local Depth Cues

photos and illustrations by the author

Distance Perception

Human Interpretation	Sculptural Techniques
Local Depth Cues:	Interposition
Comparison	Familiar Size
Positioning	
Visual Relationships:	Curvature
Tonal Contrast	Faceting
Focus	Detailing
Spatial Relationships:	Perspective
Retinal Image	Foreshortening

image the eye would have while viewing the scene. This is done through the use of **perspective**, which is "the technique of representing three-dimensional objects and depth relationships on a two-dimensional surface" and **foreshortening**, which is "the technique of shortening by proportionately contracting in the direction of depth so an illusion of projection in space is obtained." Perspective involves the placement of objects, and foreshortening involves the shaping of an object; when used together, they make the scene appear realistic. Descriptions of these techniques usually apply to two-dimensional renditions. To discuss them and their application to the restricted third dimension of relief carving, I refer to their two-dimensional aspects as **linear perspective** and **linear foreshortening**.



Linear Perspective Linear Foreshortening

Figure 2. Spatial Relationships of the Picture Plane

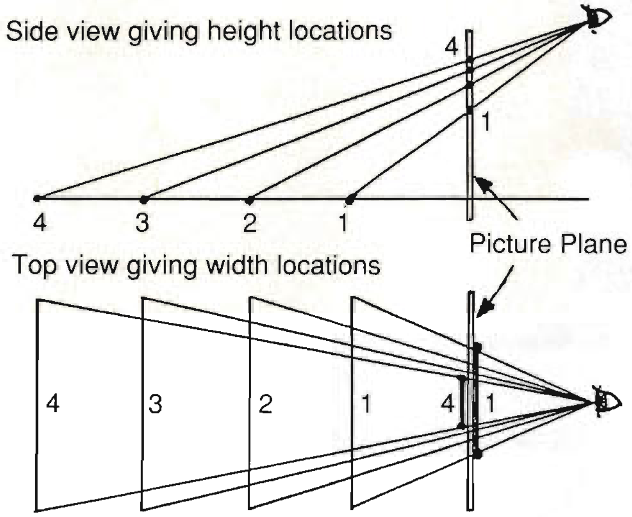

Side view giving height locations
4
1
4
3
2
1
Picture Plane
Top view giving width locations
4
3
2
1
4
1

Figure 3. The Retinal Image

Laws of Perspective

Two-Dimensional

1. All parallel lines meet at the same vanishing point.
2. All horizontal lines have vanishing points on the horizon.
3. Rotated parallel lines have vanishing points above or below the corresponding horizontal line in the plane of rotation.

Three-Dimensional

1. Direct depth representation of a flat surface in nature results in a convex surface in the sculptural third dimension.
2. Inverse depth representation of a flat surface in nature results in a concave surface in the sculptural third dimension.

Linear Perspective

Perspective is based on the fact that from each point on an object, a straight line (ray) of light reaches our eye to form the retinal image. So there are three items to bear in mind when considering the perspective of a scene: the location of the observer, the location of the objects being represented, and where the light rays from the object to the observer cross the picture plane. Figure 3 shows the locations of objects in each of the two dimensions required to attain linear perspective. All the rules of linear perspective are derived from these two views. From the side view you can see that farther objects are higher on the picture plane and are closer together. The top view shows that more distant objects are narrower. These two relationships are combined in the familiar picture of railroad tracks disappearing into the horizon (Figure 2). Since the railroad tracks are on ground level, the rails parallel, and the crossties equally spaced, they illustrate two of the laws of linear perspective:

1) All parallel lines meet at the same vanishing point, and

2) All horizontal lines have vanishing points on the horizon.

In Figure 2 the observer is standing in the middle of the tracks and looking down them, so their vanishing point is the **principal vanishing point** (PVP), and the direction he is looking is known as the **line-of-sight** (LOS).

Because the crossties are equally spaced, their diagonals are parallel to each other and thus also must meet at the same vanishing point (1st law). This is known as the **diagonal vanishing point** (DVP) and there are two of them, one for each set of diagonals.

There is still one concept to understand to be able to use linear perspective: the **horizon** (H). Since the earth is spherical, we can only see a distance which is dependent upon the height location of the observer. Figure 4 shows this and illustrates how the principal vanishing point determines the horizon in your carving. The location of the observer is known as the **station point** (SP).

To see how the horizon affects perspective, let us take another look at the railroad track scene and move to one side so that the viewer is no longer looking directly down the tracks. The scene will now appear as shown in Figure 5A. In this case, the tracks still converge at the principal vanishing point; and since this set of tracks is parallel to the previous one, the diagonals will vanish at the same diagonal vanishing points. Now rotate these

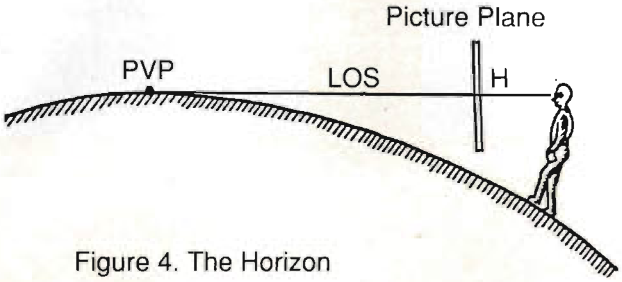


Figure 4. The Horizon

tracks ninety degrees and imagine them as a vertical fence as in Figure 5B. The top of this fence converges to the horizon since it is a horizontal line (2nd law). However, now the new diagonal vanishing points are vertically above and below the principal vanishing point as shown. In fact, the same relationship exists for any degree of rotation as shown in Figure 5C. This illustrates the third law of linear perspective:

3) Rotated parallel lines have vanishing points above or below the corresponding one in the plane of rotation.

Through the use of these three laws of linear perspective, you can learn how to depict the spatial relationships used by the eye-brain combination to give the sense of distance perception in a two-dimensional scene. The details of these methods are covered very well in many art books and thus will not be developed further here.

The Third Dimension

The relief carver has the added dimension of depth that is not available to the painter. As discussed earlier, the three ways the eye-brain combination perceives depth is through spatial relationships, visual relationships, and local depth cues. Now I'm going to discuss the carving techniques used to provide this information in the depth of the carving wood.

Visual relationships involve the variation of light intensity and the sharpness of objects as a function of distance. Since wood is mostly monotone, the only way to create a variation of light intensity is by changing the reflectance of the wood and creating shadows. When light falls on a surface, it is reflected in all directions; but the angular distribution is not equal. The more oblique the viewing angle, the less light that will be reflected and the darker the surface will appear (see Figure 6). Thus, to make distant objects appear darker, they should be carved on a more oblique surface. This is illustrated in Figure 7 which shows the familiar railroad track in linear perspective. If we were to cut the wood to see the carved profile, two of the possible approaches are shown as A and B. For choice A, the light reflectance will be the same all along the ground plane. However, in approach B, the track will appear darker as it approaches the horizon. This is the way it is in nature, so choice B will give a greater feeling of depth since it combined two of the three methods used to achieve a sense of distance.

Again, perspective involves the process of reproducing the retinal image. This means that in a picture, the object must lie on the same light ray as it does in nature. This locates the carved object on a two-dimensional plane, but not in the restricted third dimension of our carving plaque. Looking at Figure 8 you see that an object can be carved anywhere between locations A and B in the cross section and still reproduce the retinal image. Deciding where to carve the object can be solved by one of two methods which I call **direct depth perspective** and **inverse depth perspective**. It is the creative combination of these two approaches that best produces the maximum distance perception in relief carving.

The first time I saw these techniques used was in an ancient Chinese relief carving of people on a house porch, with temples and a lake in the background. The perception of distance was very good – even though the carving was only 1/2" deep. The approach was quite new to me, and I did not understand the techniques at first.

Direct depth perspective is the natural approach that would

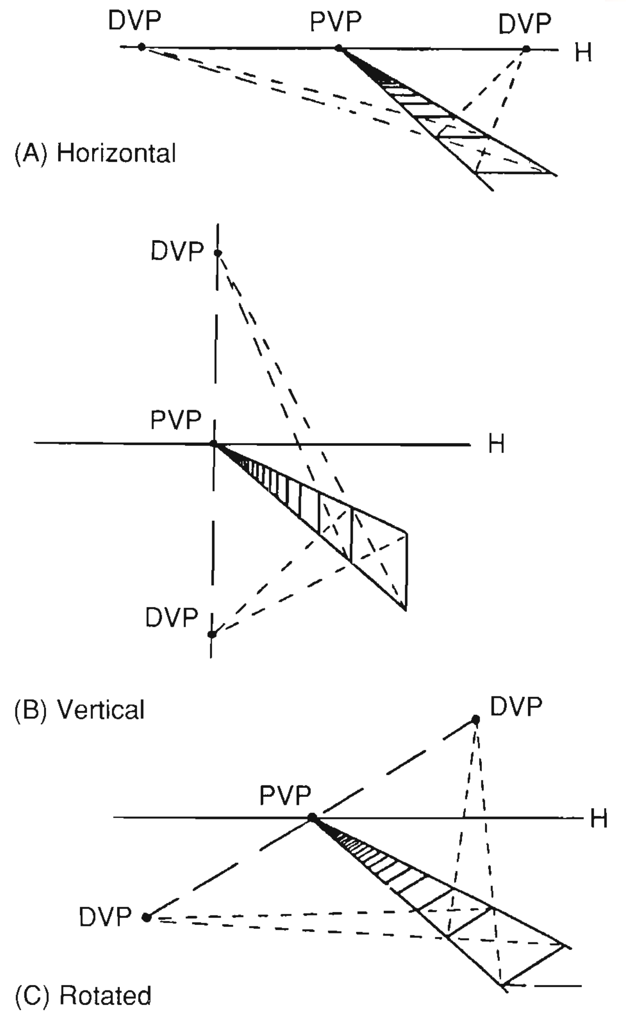


Figure 5. The Third Law of Linear Perspective

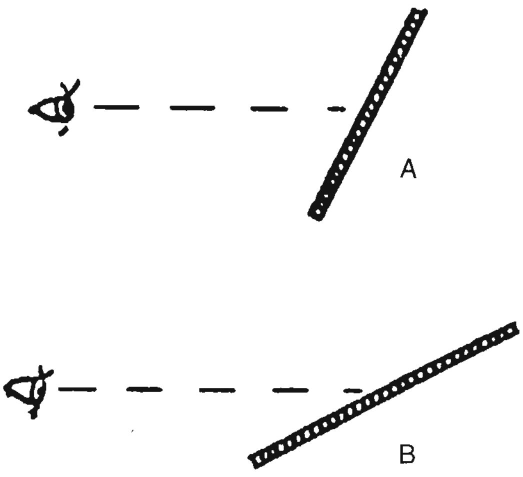
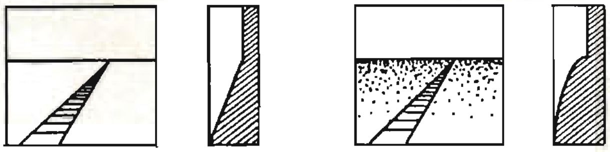


Figure 6. Light Reflectance



Choice A

Choice B

Figure 7. Visual Relationships

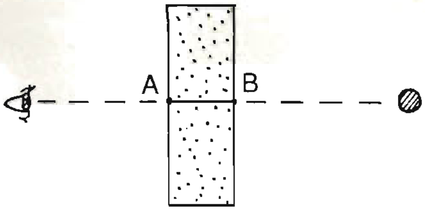


Figure 8. Indeterminate Location in Depth

ordinarily be thought of. It simply means that objects that are farther away are carved deeper in the wood – a direct relationship between depth and distance. This relationship can be linear or nonlinear. Linear means that equal depths in the wood correspond to equal distances in the scene. If you look at Figure 9 you can see that this leads to an unexpected result – the surface is curved. Figure 9A shows the locus of points in the wood representing equidistant points on a horizontal surface. These points have been placed at depths in the wood directly proportional to the distance from our eye. The same is done in Figure 9B for a vertical surface. These results demonstrate the first law of depth perspective:

1) Direct depth representation of a flat surface in nature results in a *convex* surface in the sculptural third dimension.

Note that for the horizontal plane, the surface becomes more oblique as a farther distance is represented. This will reflect less light and enhance the perception of depth through visual relationships. For a non-linear representation all you need do is to change the rate of curvature - either greater or lesser, depending upon artistic considerations for the particular scene.

Inverse depth perspective is a novel approach to providing the illusion of distance in a carving. As in direct depth perspective, in order to reproduce the retinal image you can locate an object anywhere in the depth of the wood along the line of sight (Figure 8). The natural thought of putting farther objects deeper in the wood will lead to direct depth perspective. However, more distant objects need not be carved deeper in the wood. In many cases this would require a very deep relief carving.

Inverse depth perspective more effectively utilizes the restricted depth of the wood. In this case, more distant objects are carved at a *shallower* depth. How this is done is illustrated in Figure 10 which has the same reference points used in Figure 9. The carver starts at the full depth of his carving and moves shallower for more distant objects. This figure is an example of the second law of depth perspective:

2) Inverse depth perspective of a flat surface in nature results in a *concave* surface in the sculptural third dimension.

Again, although the figure shows a linear representation, the carving does not necessarily have to be linear. You can change the curvature to whatever looks best for the scene you are carving. By skillful use of this approach, distant objects can be projected *forward*, leaving extra depth available for even more

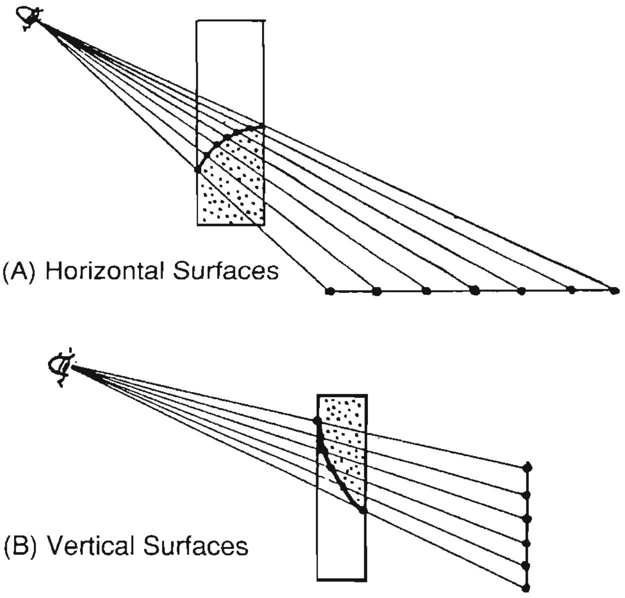


Figure 9. Direct Depth Perspective

illustrations by the author

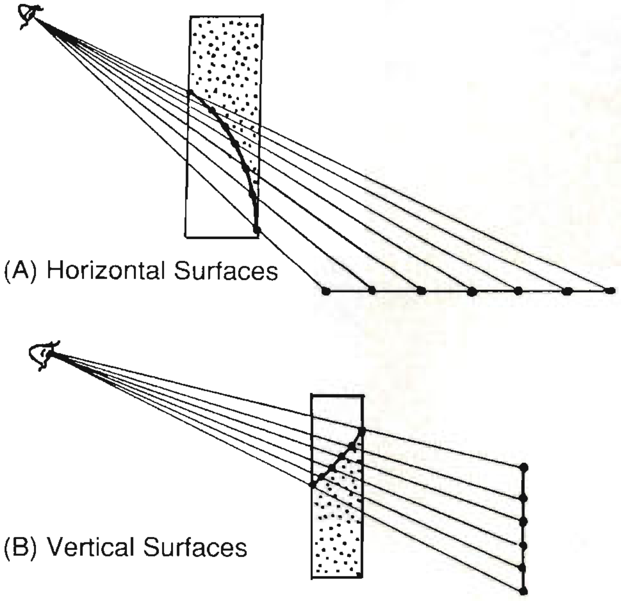


Figure 10. Inverse Depth Perspective

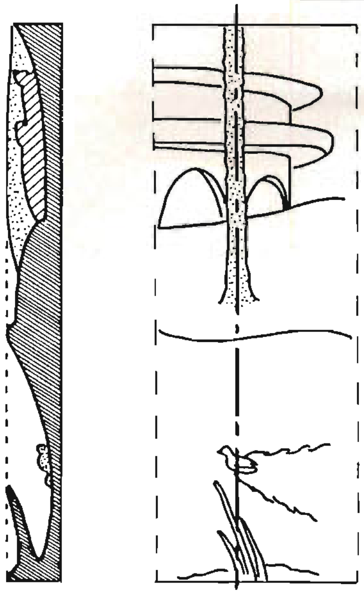
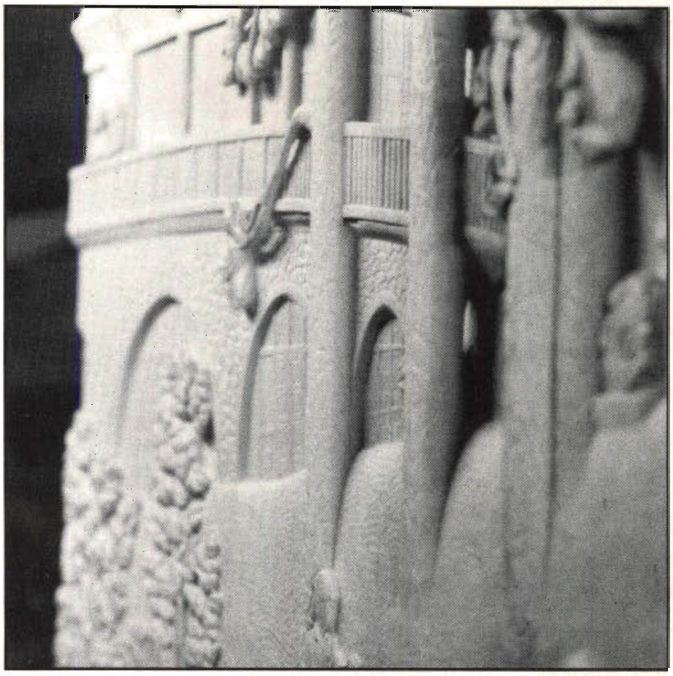


Figure 11. Layout of the Columbia Panel



In this view of the Columbia Panel, the land between the trees clearly shows the convex shape from using direct depth perspective.

distant objects.

Inverse depth perspective is most effective when the scene depicts vast expanses of land or water and when it's combined with direct depth perspective.

Figure 11 shows a cross-section view of how the Columbia panel was subdivided into three regions to enhance the feeling of distance in the 2" thickness of wood available. The central third, containing the far shore of the lake and the college's Learning Resources Building, was carved using direct depth perspective as shown in the photograph.

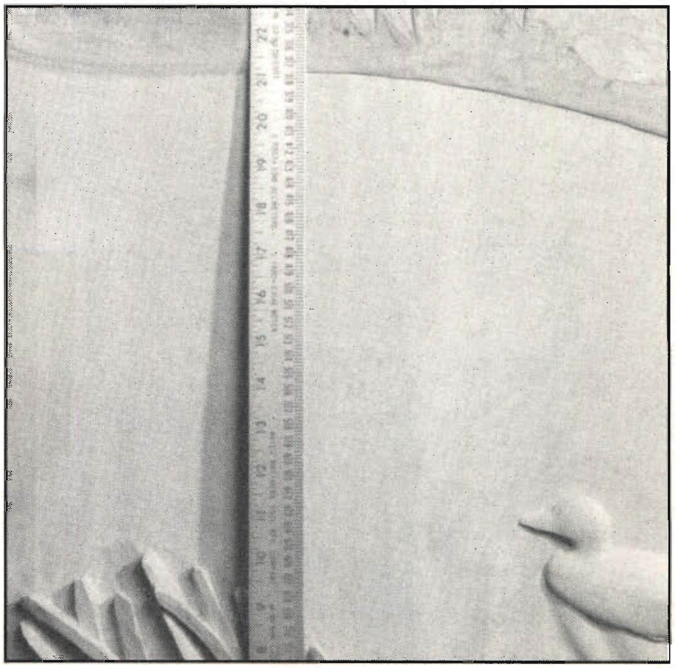
The sky in the upper third, and the lake in the lower third, were carved using inverse depth perspective. The lake portion is shown in the second photograph. During the carving, the curvature was checked using a ruler and a strong sidelight as illustrated in the photograph of the lake region. Thus by combining these techniques of depth perspective, you can create the same optical effect as would otherwise require three times the thickness of wood.

This article has shown how to create the illusion of distance through the use of perspective in both two and three dimensions. In the next issue I will discuss creating the illusion of depth through foreshortening.

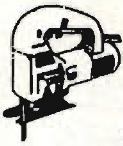
The lake portion was carved using inverse depth perspective, so it has a concave profile.

photos and illustrations by the author

The author used a ruler and a strong sidelight to check the curvature of the lake region.



BOSCH



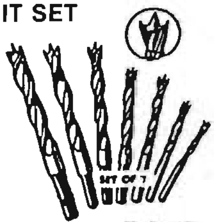
TOP HANDLE JIG SAW

ITEM # 1581VS

SALE **$122**

ITEM #	DESCRIPTION	SALE
1582VS	BARREL GRIP JIG SAW	$116
3230	JIG SAW	48
3238VS	ORBITAL JIG SAW	80
1272D	3x24 DUSTLESS BELT SANDER	159
1273D	4x24 DUSTLESS BELT SANDER	168
3270D	3x21 DUSTLESS BELT SANDER	103
3258	3 1/4 PLANER W/CARBIDE BLADE	98
1601	1 HP ROUTER	88
1604	1 3/4 HP ROUTER	115
1606	1 3/4 D HANDLE ROUTER	138
1608	TRIM ROUTER	74
1608L	LAMINATE TRIMMER	78
1608T	TILT BASE LAMINATE TRIMMER	88
1609	OFFSET BASE LAM TRIMMER	112
1609K	TRIMMER INSTALLERS KIT	156
1920RK	3/8 CORDLESS DRILL	78
1158VSR	3/8 VAR SPEED REV. DRILL	54
11212VSR	3/4 SDS ROTARY HAMMER	174
11202B	1 1/2 ROTARY HAMMER	339
11203B	1 1/2 ROTARY HAMMER WITH STOP ROTATION	365
1198VSR	1/2 VSR HAMMER DRILL	114
3268	HEAT GUN	49
1942	HEAVY DUTY HEAT GUN	57

7 PC.PREMIUM BRAD POINT DRILL BIT SET



DOUBLE SPUR BITS PREFFERRED BY CABINETMAKERS. EXTRA LONG SPURS WHICH CUT WOOD FIBERS CLEAN AND FAST. FAR SUPERIOR AND LAST 10 TIMES LONGER THAN ORDINARY BRAD POINT BITS. SET INCLUDES SIZES: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16" AND 1/2".

SALE **$18** SET OF 7 **ITEM # 7PBPD**

PORTER•CABLE

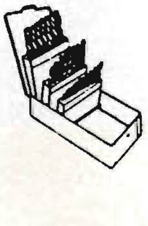
ITEM #330

SPEED BLOCK FINISHING SANDER

SALE **$51**

ITEM #	DESCRIPTION	SALE
352	3x21 DUSTLESS BELT SANDER	$118
360	3x24 DUSTLESS BELT SANDER	178
362	4x24 DUSTLESS BELT SANDER	189
555	PLATE JOINER	165

29 PC. DRILL BIT SET



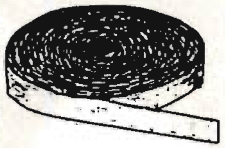
INDUSTRIAL QUALITY M-2 HIGH SPEED STEEL BITS IN FRACTIONAL SIZES 1/16" THRU 1/2" by 64THS, WITH 3/8" REDUCED SHANK. SET INCLUDES A HANDY CARRYING CASE FOR EASY ORGANIZATION AND QUICK LOCATING OF THAT NEEDED BIT.

ITEM #29RS SALE **$18**

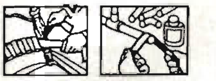
ITEM #19MB

19 PC. METRIC 1MM - 10MM SALE **$22**

ALUMINUM OXIDE CLOTH BACKED TAPE



GREAT FOR SMOOTHING, WOODTURNING, RESTORATION, FINISHING ROUNDED ITEMS AND HARD TO REACH PLACES. ALUMINUM OXIDE ABRASIVE IS ALSO EXCELLENT FOR DEBURRING AND POLISHING METAL. JUST CUT OFF A STRIP THE LENGTH YOU NEED, LOOP IT AROUND THE PART, THEN PULL IT BACK & FORTH . . . ROLLS ARE 75 FEET LONG AND 1" WIDE. GRIT 80, 150, 240.



ITEM # 75 AOC

SALE

$9 Roll 2 or more $8 ea.

makita

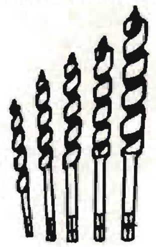
ITEM # 6093DW

3/8 CORDLESS DRILL VARIABLE SPEED REVERSIBLE

$122

ITEM #	DESCRIPTION	SALE
BO4550	DUSTLESS FINISHING SANDER	$ 44
DA3000R	3/8 ANGLE DRILL REVERSIBLE	119
9503BHKIT	4 1/2 SANDER GRINDER KIT WITH CASE	74
410	DUST COLLECTION UNIT	238
632007-4	9.6VDC BATTERY	27
632002-4	7.2VDC BATTERY	25

5 PC. DUAL-AUGER WOOD BITS



DUAL-AUGER WOOD BITS ARE THE ONES TO CHOOSE WHEN SPEED IS YOUR TOP PRIORITY. THEIR NEW SINGLE CUTTER AND SPUR DESIGN ASSURES FAST, CLEAN BORING, AND REMOVES STOCK IN MUCH LESS TIME THAN STANDARD AUGER BITS. VINYL STORAGE POUCH INCLUDED. 3/8", 1/2", 5/8", 3/4", 1".

ITEM # 5DAWB SALE **$28**

ITEM # 06DC

6" DIAL CALIPER IN WOODEN CASE

SALE **$28**

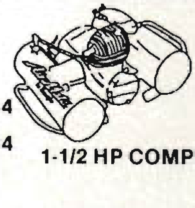
0-6"x0.001" **STAINLESS STEEL**

- OUTSIDE, INSIDE & DEPTH MEASUREMENTS
- DIAL READS DIRECTLY TO .001"
- LOCK FOR REPETITIVE SETTINGS
- CONVENIENT THUMB ROLL MAKES MEASURING QUICK & EASY
- SATIN CHROME FINISHED

ITEM #	DESCRIPTION	SALE
12DC	12" DIAL CALIPER 0-12"x0.001"	$78
06VC	6" VENIER CALIPER STAINLESS STEEL .001	18
12VC	12"VENIER CALIPER 0-12"x0.001	48

3/4 HP TWIN TANK HAND-CARRY COMPRESSOR

Emglo



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- OVERLOAD PROTECTED MOTOR
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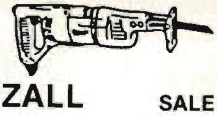
ITEM # AM39HC4 SALE **$265**

ITEM # AM77HC4 **1-1/2 HP COMPRESSOR** SALE **$275**

Milwaukee



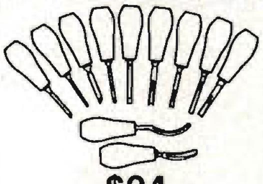
ITEM # 6511

2 SPEED SAWZALL

SALE **$118**

ITEM #	DESCRIPTION	SALE
0228-1	3/8" DRILL 3.3A 0-100RPM	$ 84
0234-1	1/2" DRILL 4.5A MAGNUM	99
0244-1	1/2" DRILL 4.5A MAGNUM	99
1676-1	H. DUTY HOLE HAWG W/CASE	225
3002-1	ELECTRICIANS RT ANGLE KIT	165
3102-1	PLUMBERS RT ANGLE DRILL KIT	172
5455	7"/9" POLISHER 1750 RPM	118
5535	7" POLISHER 2800 RPM	125
6012	1/3 SHEET ORBITAL SANDER	99
6014	1/2 SHEET ORBITAL SANDER	106
6065	7"/9" SANDER GRINDER	114
6226	2 SPEED BANDSAW W/CASE	249
6366	7-1/4" CIRCULAR SAW WITH ACCESSORIES	104
6508	VARIABLE SPEED SAWZALL W/CASE	122
6750-1	DRYWALL DRIVER 0-4000	83
6753-1	DRYWALL DRIVER 3.5A	72
8975	HEAT GUN	49

11 PC. WOOD CARVING SET



FITS COMFORTABLY IN YOUR PALM WITH THE BLADE HELD BETWEEN THE INDEX FINGER AND THUMB TO GIVE YOU A VERY CONTROLLED CUT. DESIGNED FOR WOODBLOCK CARVING, FURNITURE-MAKERS AND DECOY CARVERS.

$24 **ITEM # 11WCS**

THE DISTINCTIVE LACQUERED HARDWOOD HANDLES ARE SHAPED TO FIT THE PALM OF YOUR HAND SNUGLY, AND THE FINGERS GUIDE AND CONTROL OF THE RAZOR SHARP CARBON STEEL BLADE.

Hitachi

ITEM # C10FA

DELUXE 10# MITER SAW

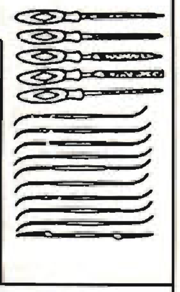
SALE **$264**

ITEM #	DESCRIPTION	SALE
TR12	3HP ROUTER WITH ALL ACCES.	$164
C6DA	6 1/4 CORDLESS CIRC. SAW	99

15 PC. COMBINATION FILE SET

ITEM # 15CFS SALE **$18**

SET INCLUDES:
5 JUMBO NEEDLE FILES MADE OF HARDENED ALLOY FILE STEEL WITH CUT PRECISION EDGES. THE PERMANENTLY ATTACHED HANDLE ALLOWS YOU BETTER CONTROL & EASE OF USE OVER STANDARD NEEDLE FILES. **10 DOUBLE ENDED RIFFLER FILES** FOR ADDING FINE DETAIL, OR CLEANING UP AFTER A RASP OR POWER BURR. YOU'LL BE IMPRESSED BY THE SMOOTH CLEAN FINISH LEFT BY THESE RASPS. THE SET WORKS EQUALLY WELL ON WOOD, PLASTICS, OR METAL.



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Events of Interest to Woodworkers

Nov 19-Dec 31, Seattle, WA
"1987 Box Competition and Container Show." A contest at Northwest Gallery of Fine Woodworking. For more information contact Cheryl Peterson, Northwest Gallery of Fine Woodworking, 202 First Avenue South, Seattle, WA 98104 or call (206) 625-0542.

December 4-6, Los Angeles, CA
The Southern California Woodworking Show at the Los Angeles County Fairgrounds. For more information contact Irene Devine, (213) 477-8521.

Dec 4-6, Syracuse, NY
"Christmas '87 Art & Craft Spectacular" at the New York State Fairgrounds. For more information contact United Craft Enterprises, Box 326, Masonville, NY 13804 or call (607) 265-3792.

Dec 4-6 and 11-13, Hartford, CT
Christmas Crafts Expos I & II (two separate shows) at the Hartford Civic Center. For more information contact Arts & Crafts Festivals, Inc., P.O. Box 412, Canton, CT 06019 or call (203) 693-6335.

Jan 7-31, Seattle, WA
"Members Only!" A showing of furniture by the cooperative. For more information contact Northwest Gallery of Fine Woodworking, 202 First Avenue South, Seattle, WA 98104 or call Cheryl Peterson at (206) 625-0542.

Jan 8-10, Norfolk, VA
1st Annual Virginia Show at The Norfolk Scope. For more information contact Woodworking Association of North America (W.A.N.A.) P.O. Box 706, Plymouth, NH 03264 or call (800) 521-7623.

Jan 15-17, Ontario, Canada
The Toronto Woodworking World Show at the Skyline Hotel. For more information contact The Woodworking Association of North America, 706 Plymouth, NH 03264 or call (603) 536-3876 or (800) 521-7623.

Feb 4-28, Seattle, WA
"On a Scale From One to Ten: Ten Top Turners Do Ten Turnings" at the Northwest Gallery of Fine Woodworking. For more information contact Cheryl Peterson, Northwest Gallery of Fine Woodworking, 202 First Avenue South, Seattle, WA 98104 or call (206) 625-0542.

Feb 13-15, Washington, D.C.
4th Annual Woodworking World Show at the D.C. Armory. For more information contact The Woodworking Association of North America, P.O. Box 706, Plymouth, NH 03264 or call (800) 521-7623.

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Greater Milwaukee	Feb. 19-20-21	Mecca Convention Hall
Florida	March 4-5-6	Curtis Hixson Conv. Ctr., Tampa
No. California	Mar. 25-26-27	San Jose Convention Center
Atlanta	April 8-9-10	Georgia Int'l Conv. Ctr., Atlanta
So. California	April 29-May 1	Los Angeles Airport Hilton
North Texas	May 6-7-8	Dallas Convention Center
Chicago	May 13-14-15	Pheasant Run Expo Hall, St. Charles
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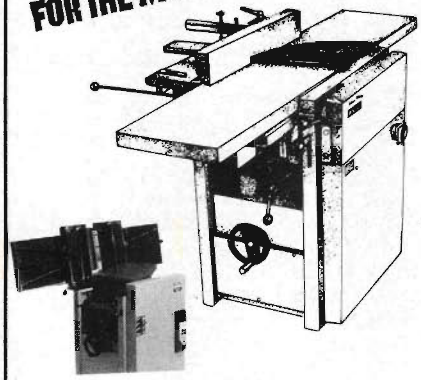

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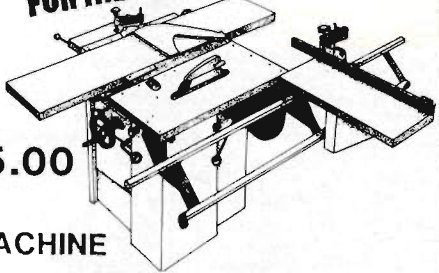

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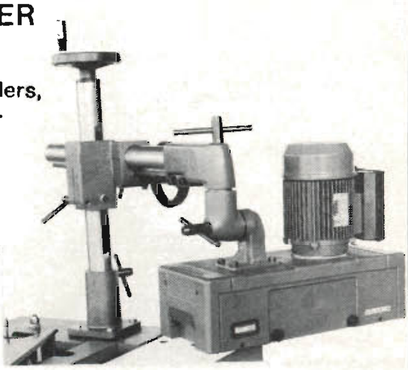

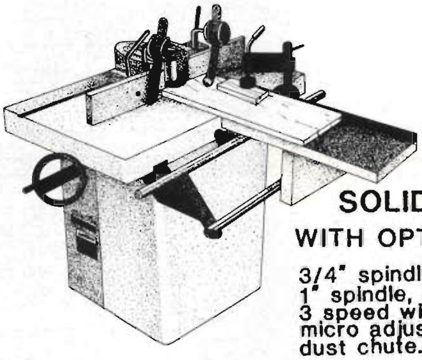

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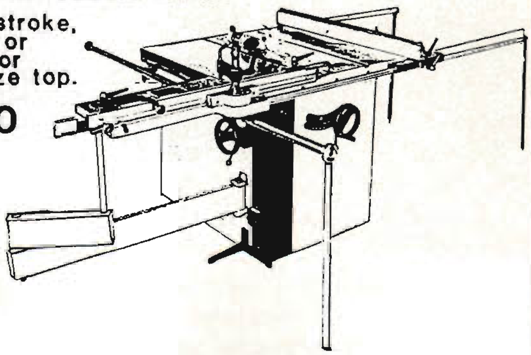

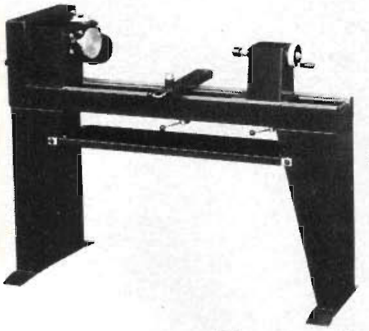

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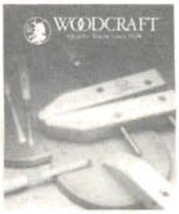

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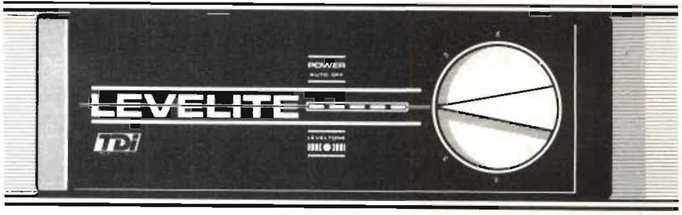

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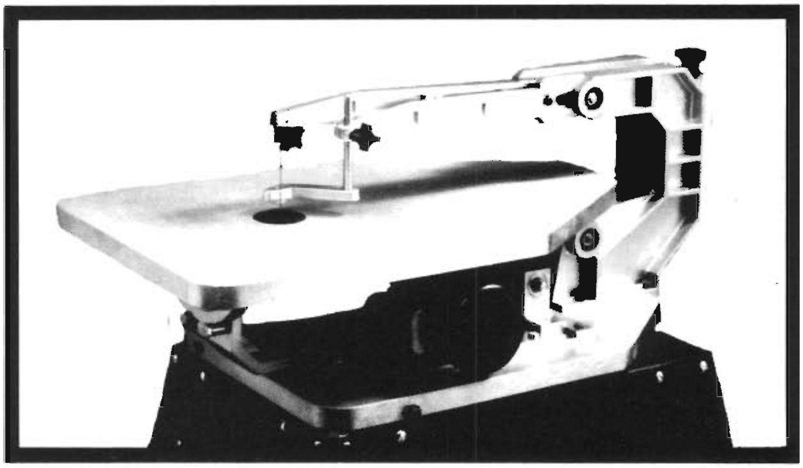

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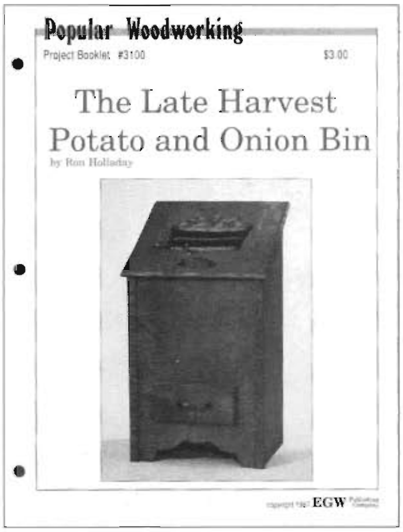

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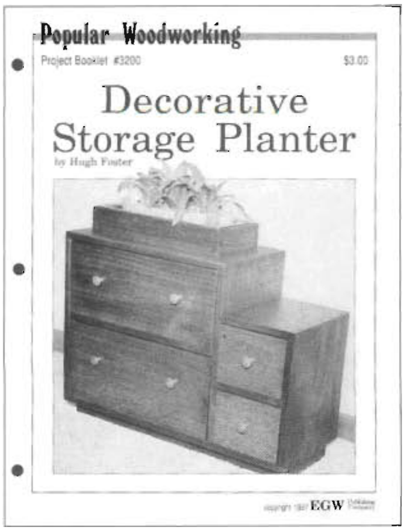

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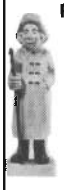

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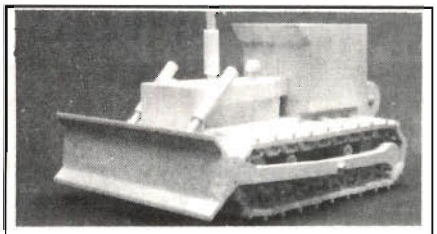

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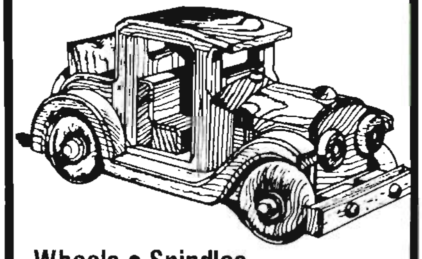

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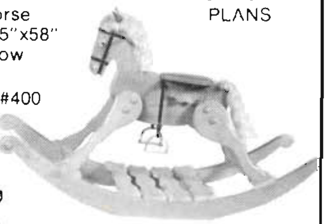

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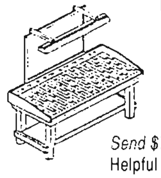

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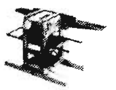

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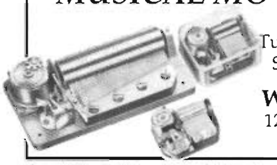

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Out of the Woodwork

by Darwin Crum

That's Why They Call Them Screws

Charlie had the nicest shop in our part of town. His shop had good lights and was always neat. The tools were sharp and properly stored. He was proud of his shop, and rightly so; it was a shop any man could be proud of. Charlie had spent the better part of twenty years getting it to perfection...almost.

Charlie sits upstairs in the evenings nowadays. His shop is dark and the cobwebs have pretty much taken control. Some of his tools are starting to rust and it's not likely that anything will be done about it. He doesn't go down to the shop anymore, and if you ask about his hobbies, Charlie will mumble something and try to change the subject. Actually, he knits in the evenings now, trying to forget about his shop.

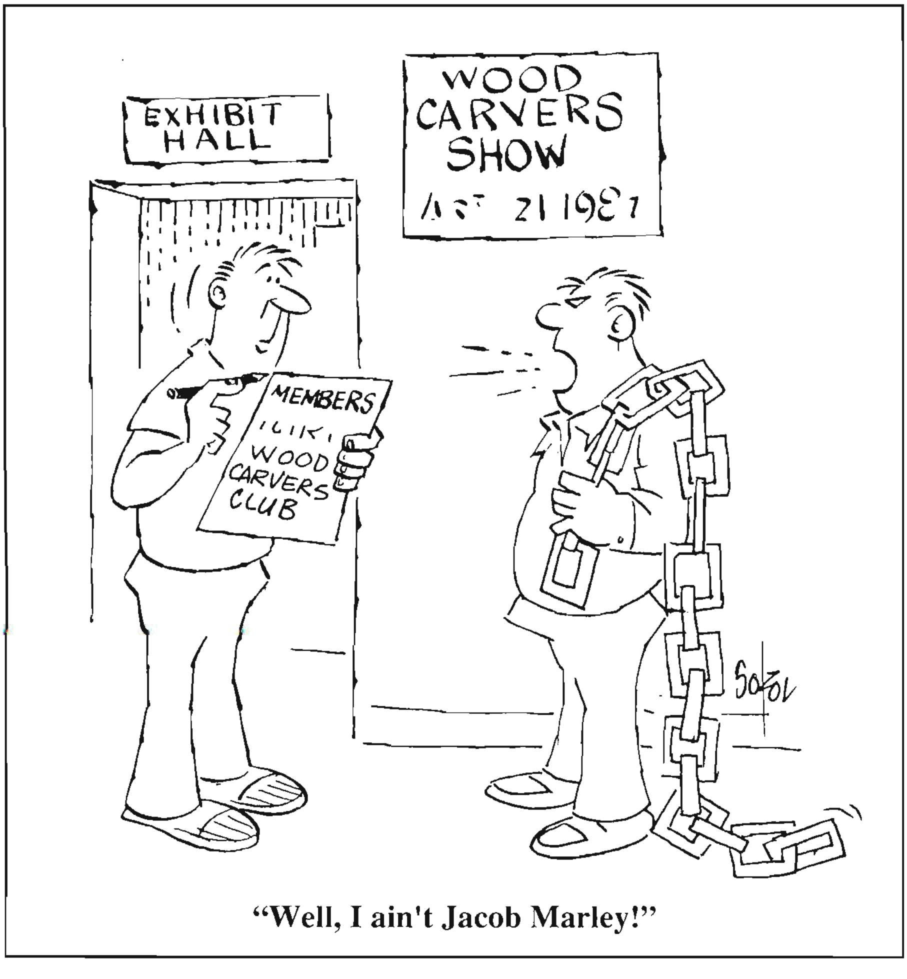
Charlie didn't know it, but his shop started closing the day he decided to put in the finishing touch: his own complete wood screw supply.

***Darwin R. Crum** is a home handyman and freelance writer from Schaumburg, Illinois.*

Like most men who build things, Charlie worked from plans. The plans he used always had a cutting list that told him exactly what was needed to complete the "Sixteen–Drawer Victorian Panty Hose Buffet," or the "Handy Utility Table Converts to Spare Bedroom." Charlie usually took the list shopping before starting his next project.

Over the years, thousands of trips to the lumberyard and the hardware store were made. Thousands of times, Charlie would buy just what he needed for the project at hand, except for wood screws. Wood screws were different. The number of wood screws that was needed was never the same number of wood screws in the package on the rack at the store.

If the panty hose buffet needed 43 screws, Charlie had to either buy fifteen packages of three screws each, or a box of 200 screws. The first choice was terribly expensive since the screws would cost about eighteen cents apiece, including the two extra ones. The second was even more expensive because Charlie would be buying an extra 157 screws which might not be used for years.



"Well, I ain't Jacob Marley!"

This was bothersome. Charlie had the usual box of assorted screws that had collected over the years, but he knew that there were always a few less in the box than he needed, and that the time spent looking for just one more to match the seven he had already found would have been enough to build the "Thirty–Foot Cabin Cruiser With Disappearing Bait Well" that he had been edging up to for years. Charlie just went out and bought the screws the cutting list said he should, so the box of assorted and unsortable screws grew a bit heavier with every project.

The ad said "Have Your Own Hardware Store Right *in Your Shop!" It* grabbed Charlie's attention because it said precisely what he had been planning after building the "Rolling Kitchen Cart Has Its Own Ice Bucket" with nine, 1-1/2 X #10 flat head wood screws left over. A little voice in Charlie's head said, "You use enough screws. Why not lay in a supply of them so you don't have to go through that charade at the store ever again?" It was the voice of doom.

At his "Handy Shop Desk Doubles as Gluing Fixture" Charlie sat down and made a complete inventory of what would be needed to outwit the next cutting list. It soon became complicated. There was a lot to learn about the permutations and geometric progressions of wood screws.

Charlie started by listing the lengths from 1/2" to 2-1/2" in 1/8" increments. That made seventeen lengths. "Not too bad," he thought, so he decided to lay in the four most common diameters; #6's, #8's, #10's, and #12's. That meant four times seventeen different screws on his list. Charlie planned on making a cabinet that was *four drawers* high and seventeen drawers wide. It would fit on the wall right over his workbench. He figured it could be knocked out in about a week.

The fronts for all 68 drawers had been cut before he remembered to include flat heads and round heads. He sat down and re-drew the plans.

The revised cabinet would be seventeen drawers high and eight drawers wide, standing right next to the sump pump.

Charlie planned on finishing his Wood Screw Control System in about a month or so.

Charlie began to feel that things were getting out of hand when he decided to opt for slotted and Phillips head screws. The calculation now read seventeen lengths times four diameters times two heads times two slots. That's 340 drawers to make! Charlie was going to use a lot of screws just making something to put his screws in. "It's going to be worth it," said Charlie, as he dreamed of walking over to his own screw assortment, each drawer neatly labeled, and casually glancing at the list in his hand while taking out all the screws needed to build the "Wine Rack Doubles as Tent Frame." Oh, it would look glorious standing there in front of the furnace, all twenty drawers high by seventeen drawers wide! He hoped that it would be done sometime in August.

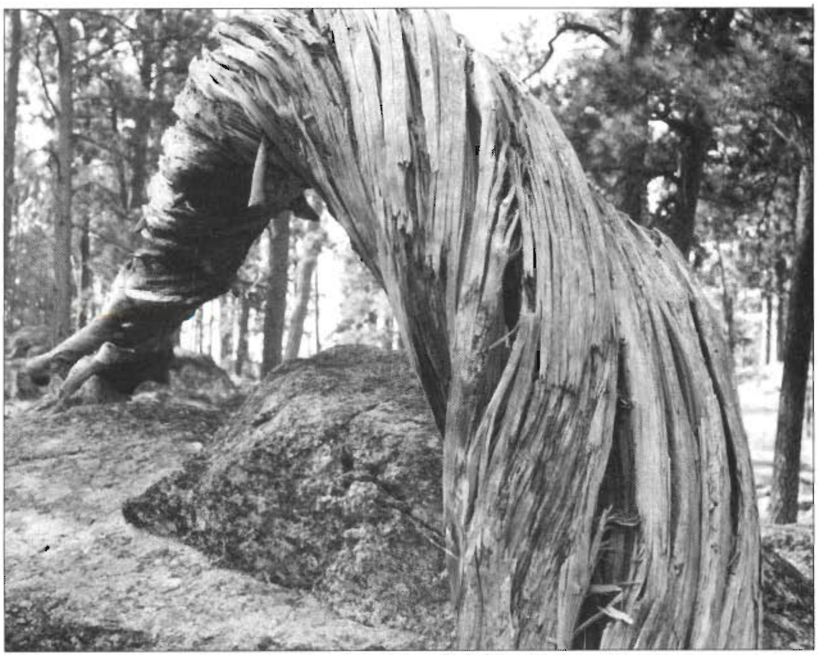
Charlie finished all 340 drawers, then labeled them with Dymo™ tape, complete with an elaborate color-code system (green for flat head, red for round head, etc.) Then he laid out nearly $1,250 to stock the cabinet. Finally, he could stand back and smile. It had been a big job and an expensive one, but it was done now, and Charlie was proud and happy. His shop was a lot closer to perfection – maybe even close enough to win an award of some kind.

Even more important was the sure knowledge that he would no longer waste time stirring up the mess in his assorted screw box, hoping to find just one more screw to match the others. No more trips to the store to buy the wrong amount of screws for too much money. Charlie had the Wood Screw Monster tamed and was set for life.

"Leaf Caddy/Barbecue Makes Exciting Yard Accessory!" was the next project that caught Charlie's eye. He read for about fifteen minutes before coming to the cutting list....

Charlie sits upstairs nowadays, while his tools rust away in the basement. He doesn't say too much, and he *never* talks about his shop anymore. His wife isn't much help explaining. All she will say is, "I don't know what happened. One day he was reading a magazine when he suddenly stood up and yelled something. Then he sort of fell back and slumped down in his chair. It sounded like he may have shouted 'BRASS?!'" PW

Fury in the Forest



Gale-force mountain winds twisted and toppled this pine tree into its present shape. Devil's Tower, Wyoming. Photograph by Grover Brinkman.

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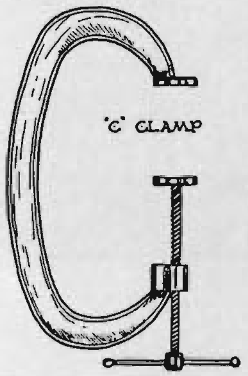

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